the OIL AND GAS JOURNAL

MAY 14, 1956

Is Drilling TOO Cheap?

Contractors say company pressure is ruining them.

Say the companies: It's contractors' own fault. p. 96

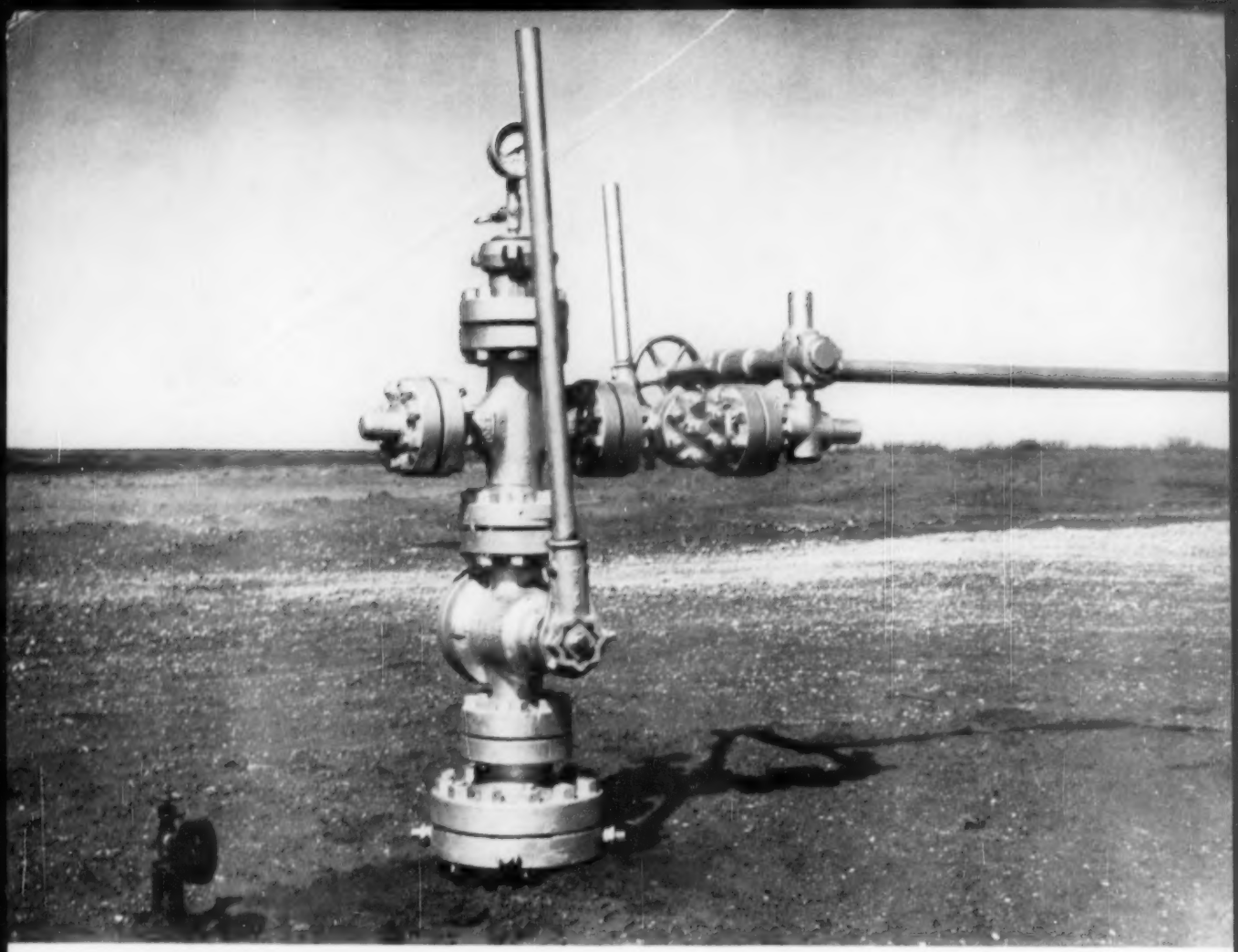
• Unseen, Unheard, and Unsmelled

. . . Three-way goal of Los Angeles refiners. p. 157

• California's Biggest Water Flood

. . . demonstrates industry's most advanced techniques. p. 122

Northern Raton Basin—A Challenging Exploratory Frontier. p. 128



Shut Tighter, Open Easier ... Stay Trouble-Free

A Christmas Tree is only as trouble-free as its valves. Rockwell-Nordstrom valves have *proved* best for dependable, permanent completions because they are lubricant sealed for really *positive shut-off*. Lubricant also jacks the plug for *instant* quarter-turn operation . . . even after the valve has been open or closed for months. And since the unexposed seats can't be cut away, Rockwell-Nordstrom valves stay trouble-free longer; cost less to use.

Rockwell-Nordstrom Christmas Tree valves are available in semi-steel, steel, and special corrosion resisting coatings for pressures to 10,000 lb. Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Valve Licensee:* Peacock Brothers Limited.

ROCKWELL-Nordstrom **VALVES**

Lubricant Sealed for Positive Shut-Off

40th YEAR *of lubricated plug valve leadership*

A Glance Ahead . . . . at press time

These trends will make TOMORROW'S NEWS

Multimillion-dollar pressure-maintenance projects are being held up in several big West Texas oil fields because of currently unfavorable economics.

Operators won't be quoted, but they say the attitude of the Texas Railroad Commission toward such projects already operating has discouraged the starting of others. Several of the giant programs started in the past few years have succeeded in increasing bottom-hole pressure, cutting gas-oil ratios, and assuring better recovery, but are being held to pre-unitization production rates.

The latter in most cases are well below yardstick allowables for the respective depths. The companies say they can't afford to spend huge sums for pressure maintenance if they must wait 40 to 80 years to begin to get it back. This contrasts with commission treatment of secondary floods in depleted fields, which have been permitted to produce all the oil they can, even in excess of yardstick figures.

A couple of well-known development and engineering firms in the oil business are planning to use their know-how to enter directly into the petrochemical business. M. W. Kellogg, already making fluorocarbons, is planning a polyolefin plant in the Houston area. Houdry Process Corp. has developed some new petrochemicals which are about ready for commercial application.

Look for new data this year on road octane ratings of various commercial gasoline blends in current automobile models. They'll underscore two things. First, today's cars show a fairly wide variation in severity, or the degree to which they depreciate research octane numbers. Second, olefins are becoming more and more the problem children in commercial gasolines.

The International Petroleum Exposition will coincide with the U. S. oil industry's centennial celebration. The show has been set for May 1959 in Tulsa, 100 years after the Drake well was brought in near Titusville, Pa. The last exposition was held in 1953.

Look for Canadian imports of Venezuelan and Middle East crude to decrease. What may be a move in this direction was Interprovincial Pipe Line's announcement of plans to extend its line east from Sarnia to Toronto. This indicates Interprovincial later may expand into the big Montreal refining area. By moving on to Montreal, Interprovincial could lay down western Canadian crude at a price competitive with the imported crude.

There's a trend toward more detailed resistivity curves for quantitative formation analysis from well logs.

One method sure to receive a lot of attention when commercially available is the use of the profile from multiple resistivity curves as an indicator of mobile hydrocarbons.

The presence of producible oil can be obtained directly from the log without need for corrections or calculations. The method has been criticized as being too dependent on equipment, formations, mud and filtrate invasion. It may be misleading when used indiscriminately by semiskilled people. However, its big appeal is simplicity. Whether it can find more oil than present methods remains to be seen.

the OIL AND GAS JOURNAL

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211 South Cheyenne Ave.
Phone Diamond 3-6291

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NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-6160

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Paul Swain ... International Editor
Ray G. Gibson ... District Editor

HOUSTON OFFICE
802 Sterling Building
Phone CApitol 4-7726

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Joe Reilly ... District Editor

DALLAS OFFICE
1238 Mercantile Bank Building
Phone STerling 3074

Robert J. Enright ... District Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone VAndike 0722

D. H. Stormont ... District Editor
William T. Smith ... District Editor

WASHINGTON OFFICE
621 Albee Building
Phone District 7-1710

Bertram F. Linz ... District Editor

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., Mount Pleasant, Mich., Melbourne, Australia; Regina, Sask.; Chatham, Ont.; Casper, Wyo., and Anchorage, Alaska.

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TECHNOLOGY—OPERATION

Drilling—Production

California's Biggest Water Injection Project **122**
By D. H. Stormont

The Russell Ranch field flood uses the industry's most advanced techniques. The unit uses both skimming pits and flotation cell to free oil from water. Filters are leaf type with a coating of asbestos and diatomaceous earth. The 1,200-acre pool being flooded contains 78 of the field's 155 producers.

New Pressure Filter Proves Worth at Russell Ranch **126**
By D. H. Stormont

With a filter surface only half that of conventional leaf-type units, this new low-cost filter was found capable of handling twice as much water. Back-washing is rapid and thorough with minimum water, and a one-point control system regulates operations.

Man-Made Island to Base 70 Drilling Wells **140**
By D. H. Stormont

This million-dollar island erected 1½ miles offshore from California's Seal Beach in 45-ft. waters may prove to be the most practical type of structure for developing offshore reserves.

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By Paul S. Ache and Dr. John M. Campbell

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By Dr. H. C. Schutt and S. B. Zdonik

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Refineries Should Be Unseen, Unheard, Unsmelled **157**
By D. H. Stormont

That's the three-way goal of Los Angeles refinery managers for their plants. And teamwork is bringing about economical air pollution control. Expensive control devices alone won't do the job. The human side of the problem is just as important as the plumbing, maybe more so.

On-The-Job: In The Plants: Telescribers Aid Product Control **163**
By D. H. Stormont

Errors inherent to sending and receiving laboratory analyses data by telephone are eliminated by the telescriber setup at the El Segundo refinery of Standard Oil Co. of California.—Other items.

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By Paul Reed and R. G. Deering

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Pipeline Patrol: Construction **179**

Exploration

The Northern Raton Basin **128**
By Jerome A. Lewis

The Raton basin has all the earmarks of an oil province . . . thick section of marine sediments, known surface anticlines, excellent possibilities for stratigraphic traps, and noncommercial shows of oil and gas.

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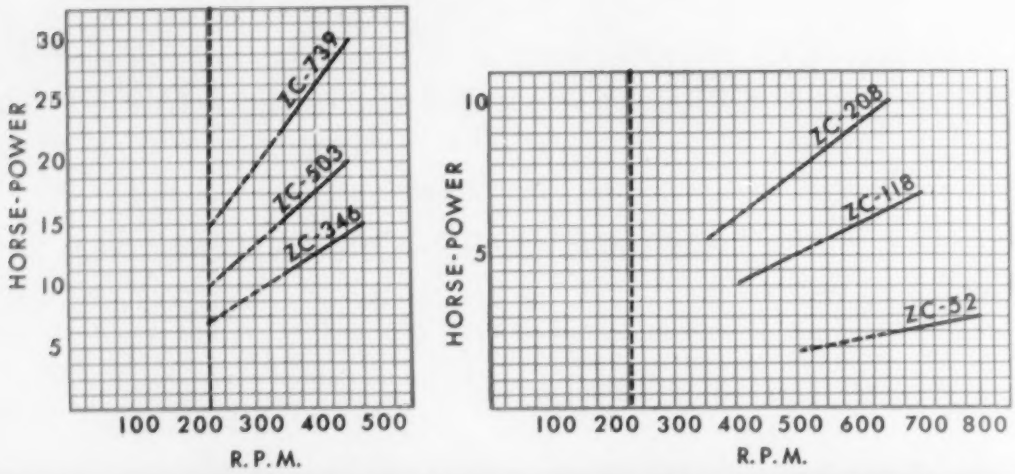

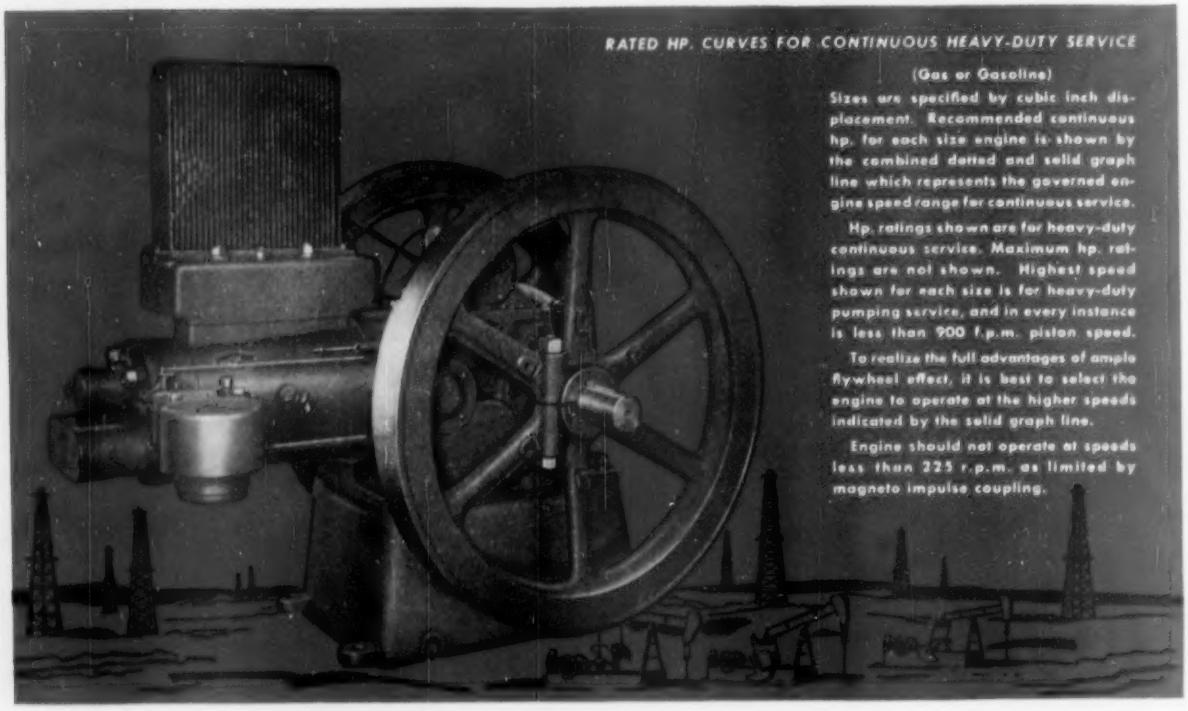

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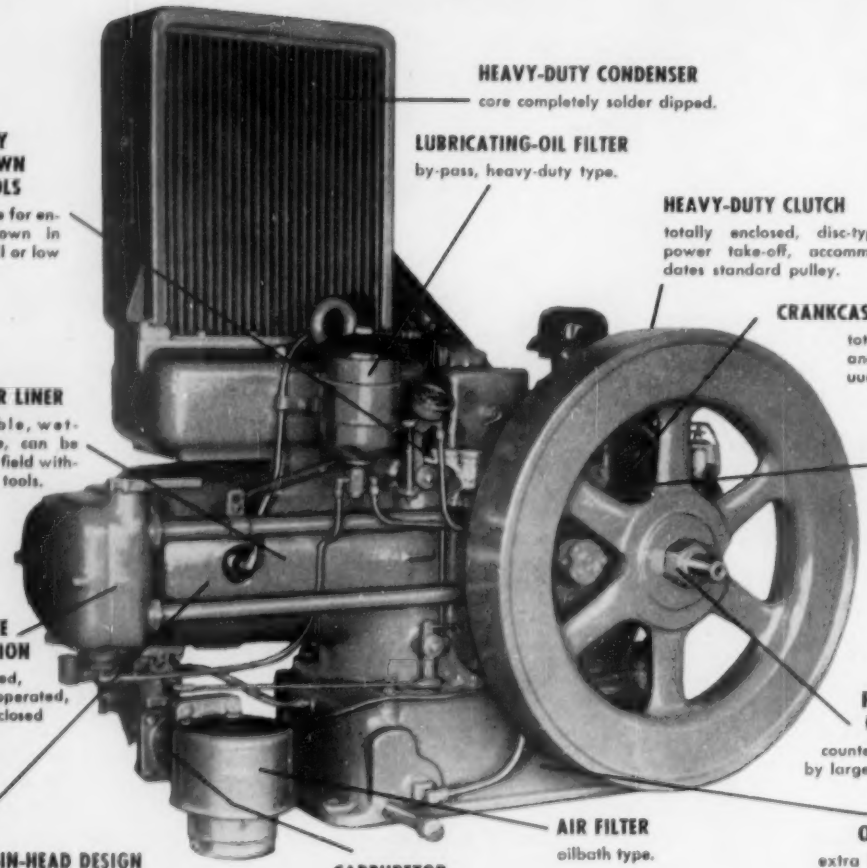

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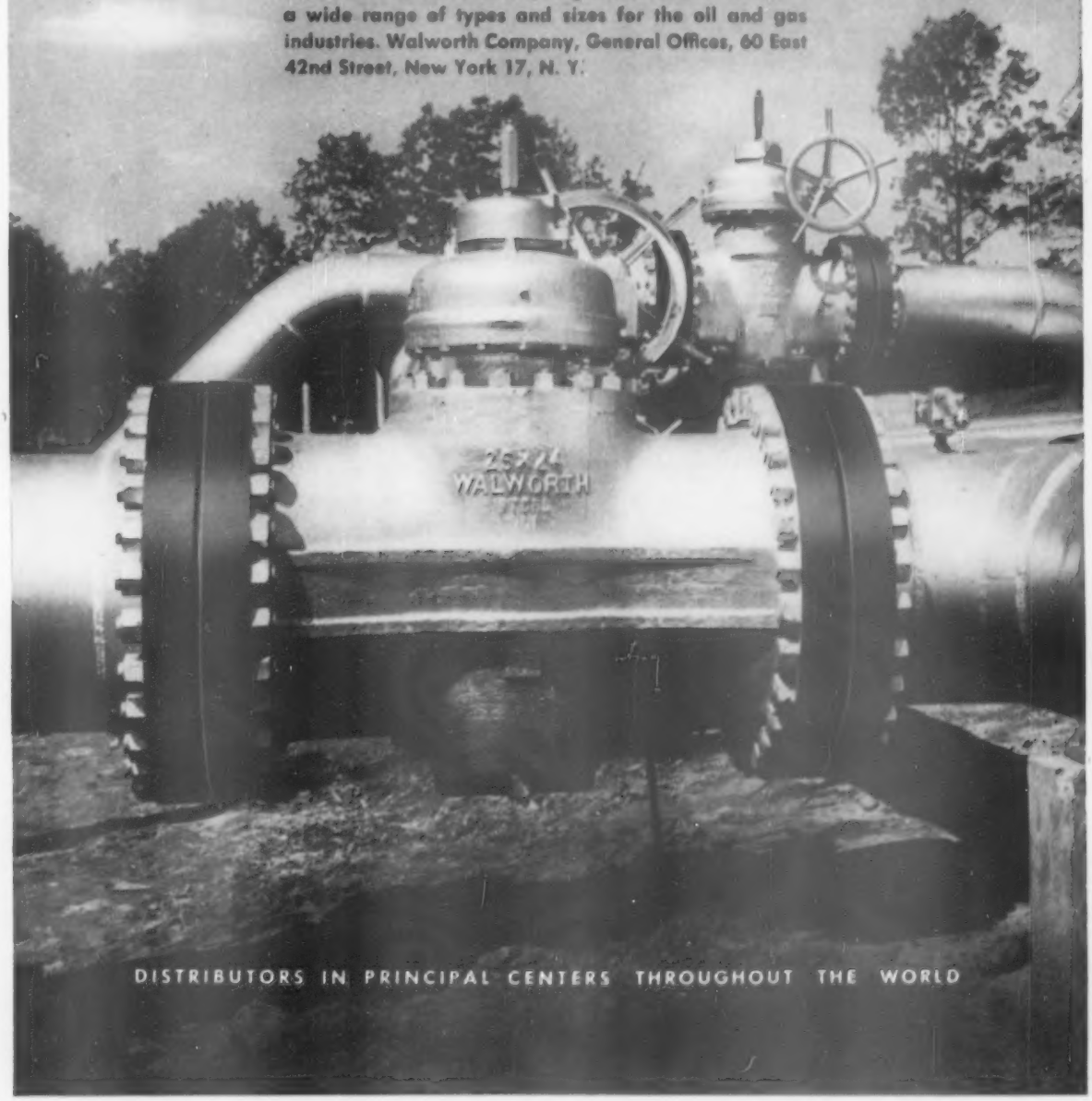

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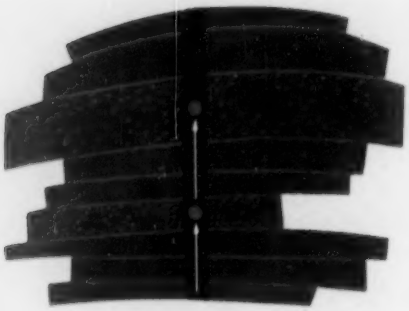

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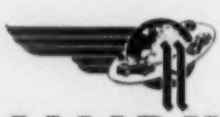

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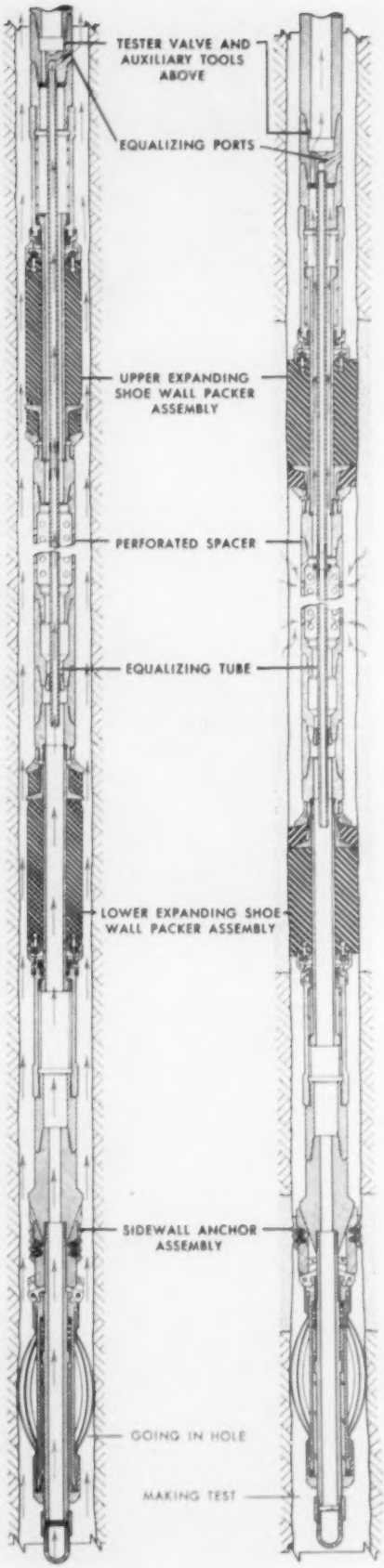
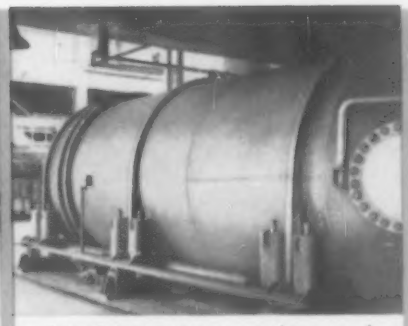
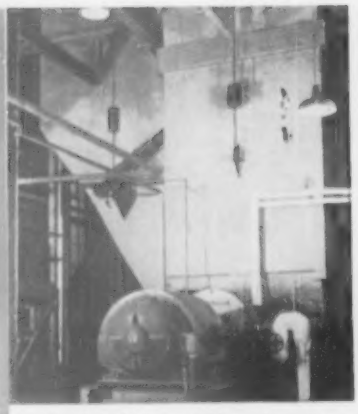


Base for supporting refinery tower, provided with Grinnell Spring Hangers for flexible support.



Grinnell Spring Hangers on large vessel of catalytic cracking unit in oil refinery.



Induced draft duct and blower in power station. Operates at about 500°F. Supported by Grinnell Spring Hangers.

To support loads that won't stand still . . .

GRINNELL PRE-ENGINEERED SPRING HANGERS

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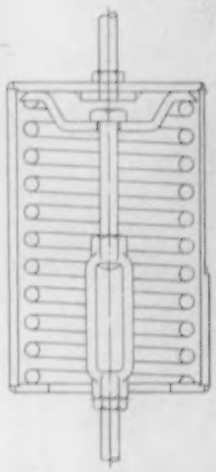
- Easy selection of proper sizes from simple capacity table.
- Installation is simplified by integral load scale and travel indicators.

*Precompression is a patented feature.



VARIABLE SPRING HANGER FIG. B-268

Fig. B-268, Type A, is designed for attachment to its supporting member by screwing a rod into a bushing in the top cap of the hanger. Adjustment of the hanger load is accomplished by turning the turnbuckle on the lower hanger rod until the hanger picks up the load and the load indicator points to the desired position. Six other types of attachment are available.

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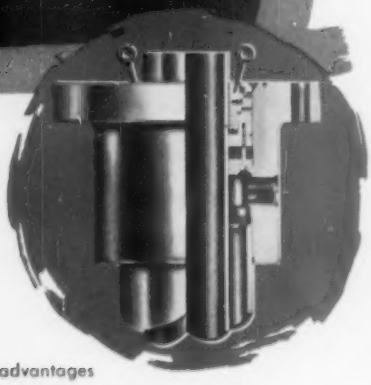

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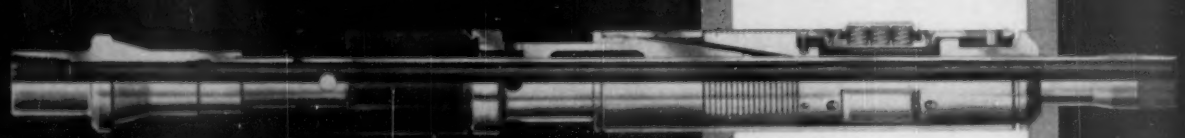
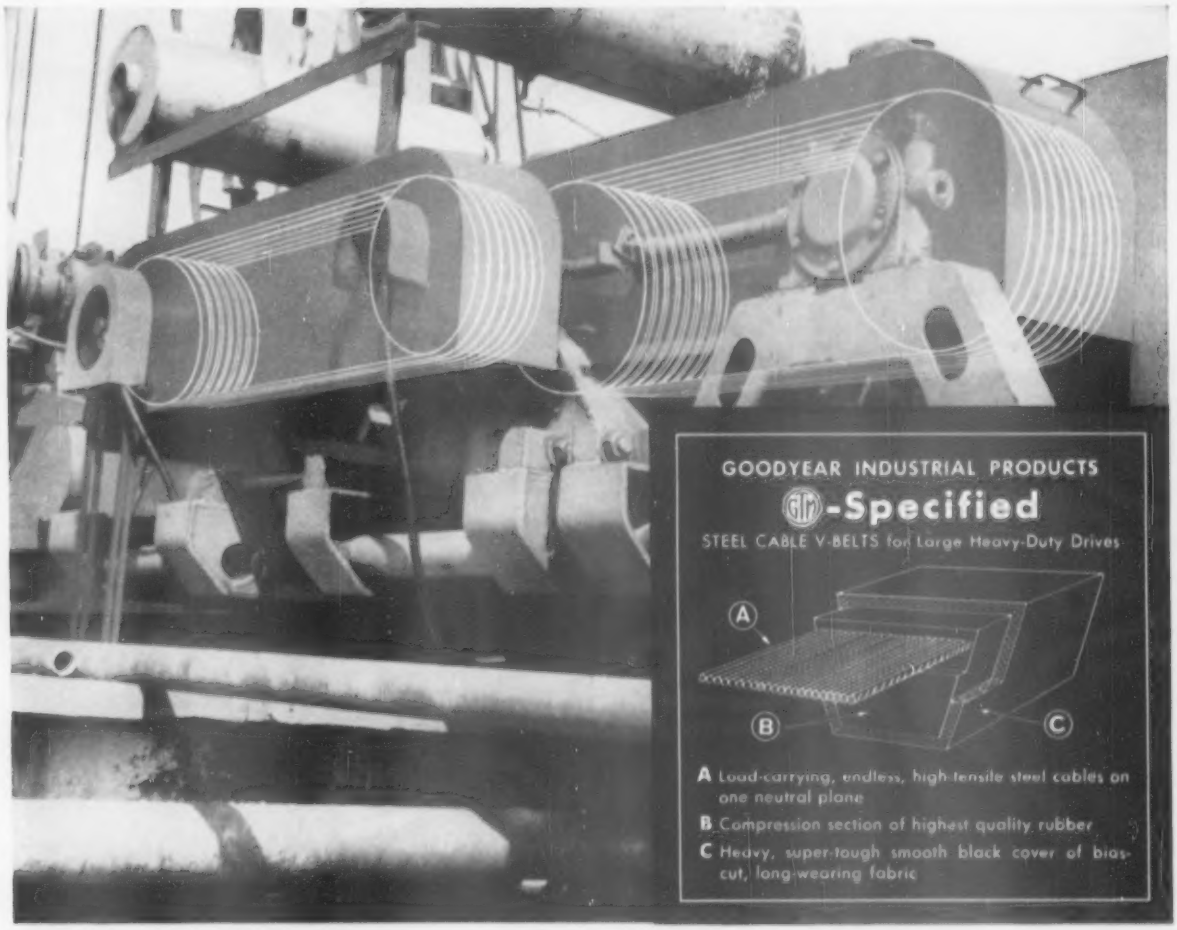



GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
STEEL CABLE V-BELTS for Large Heavy-Duty Drives
A
B
C
A Load-carrying, endless, high-tensile steel cables on one neutral plane
B Compression section of highest quality rubber
C Heavy, super-tough smooth black cover of bias-cut, long-wearing fabric

G.T.M. belts drives that drill 105,000 feet of hole

WHEN other systems were used on the compound and pump drives of this portable rig, service life was low and maintenance high. A change to V-belts was considered, but the operators were wary of the extremely limited take-up space.

The G.T.M. – Goodyear Technical Man – confidently recommended matched sets of Steel Cable V-Belts (see blueprint). Result: At last report, these super-belts had drilled over 105,000 feet of hole – faster, smoother, cheaper – and were still going strong. Another result: Steel Cable V-Belts are now specified by the manufacturer for rigs of this type.

Similar service on V-belts or other rubber goods may be yours by consulting your Goodyear Distributor or the G.T.M. Or write: Goodyear, Industrial Products Division, Akron 16, Ohio.

STEEL CABLE V-BELTS by

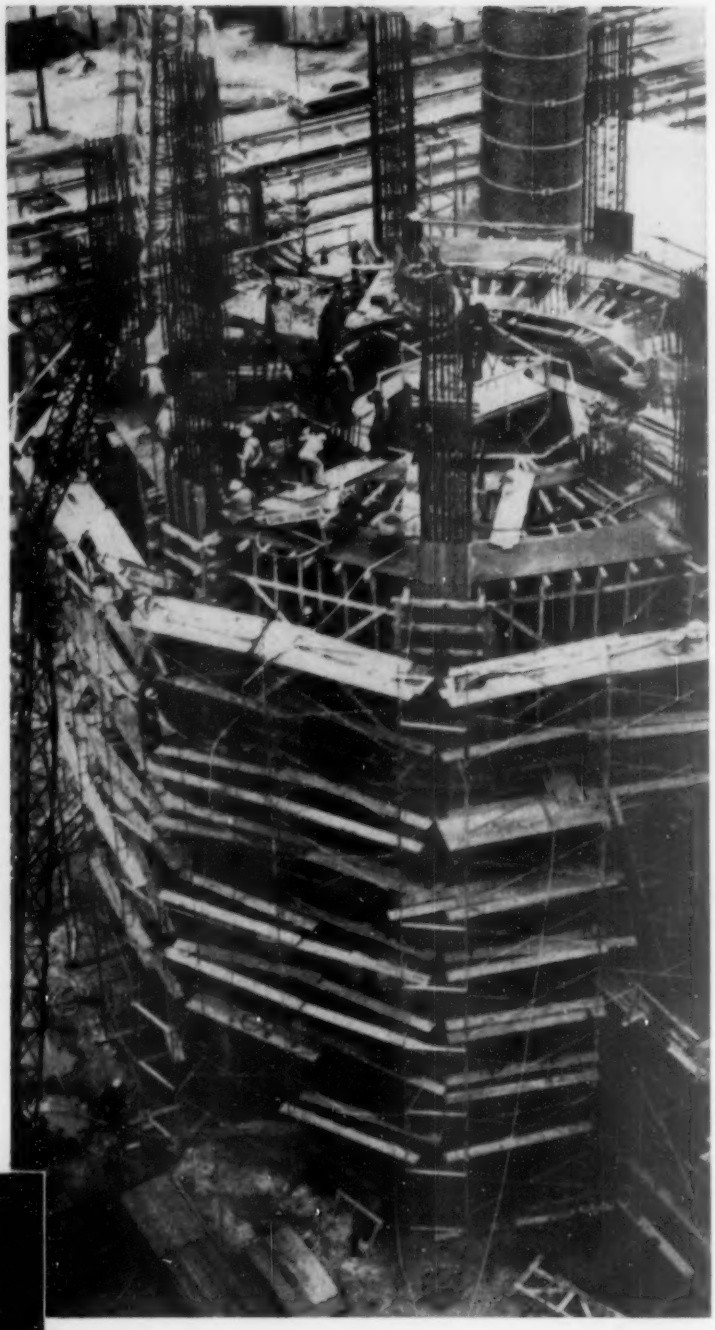
GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

Going UP!

World's Largest Airlift TCC Unit is now being built at Beaumont, Texas. This 35,000-Barrels-A-Day Unit is one of 50 Airlift TCCs built or building all over the world.



Part of New York's skyline—TCC Unit at Socony Mobil's Brooklyn refinery.

West Germany—TCC Unit at Heide Refinery of Deutsche Erdol-A.G.

TCCs are operating on all six continents—from Finland to Formosa, from Australia to Turkey

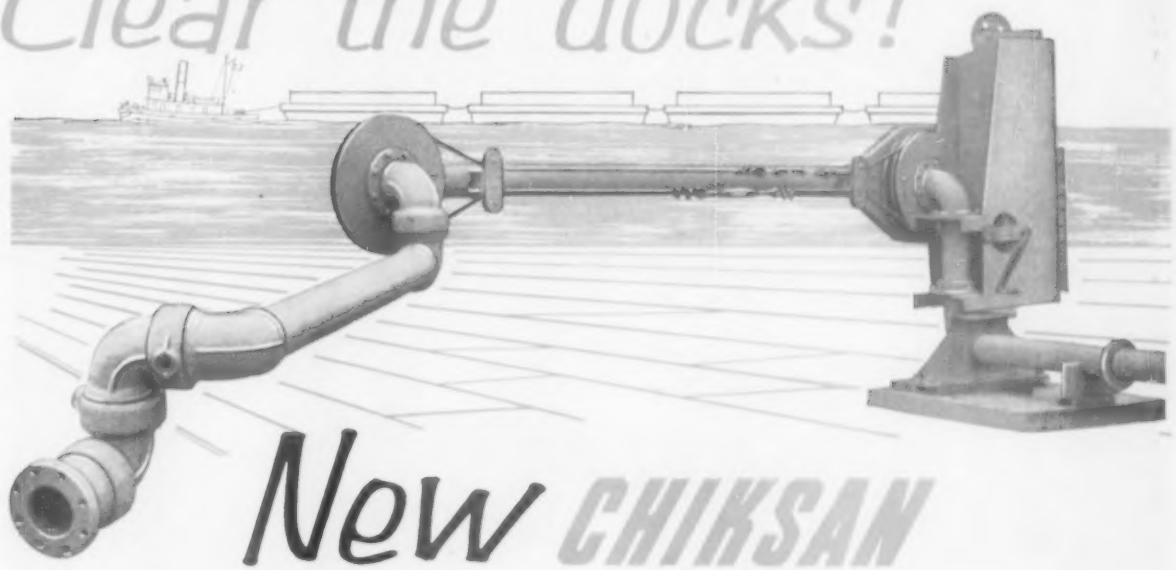
The Airlift Thermofor Catalytic Cracker is licensed by:

SOCONY MOBIL OIL COMPANY, INC.

26 Broadway, New York 4, N. Y.

FOR FAST, SAFE BARGE LOADING

Clear the docks!



New CHIKSAN BARGE LOADING ARM

SAVES ON

Line Handling Injuries
Dock Clutter
Lengthy Hookup Time
Hose Bursts
Replacement Costs

This newly developed barge loading arm ends hazardous manhandling of loading hoses, eliminates dangerous dock clutter. Mechanical operation makes hookup fast and simple . . . one man can handle the job in minutes with no physical strain.

Ball bearing swivel joints make it possible to rotate the arm to meet varying flange locations. After arm is flanged to barge riser, it can be left unattended. Arm will automatically conform to the various positions of the barge as loading or unloading is carried out. When not in use the operation arm can be raised up and out of dockside traffic.

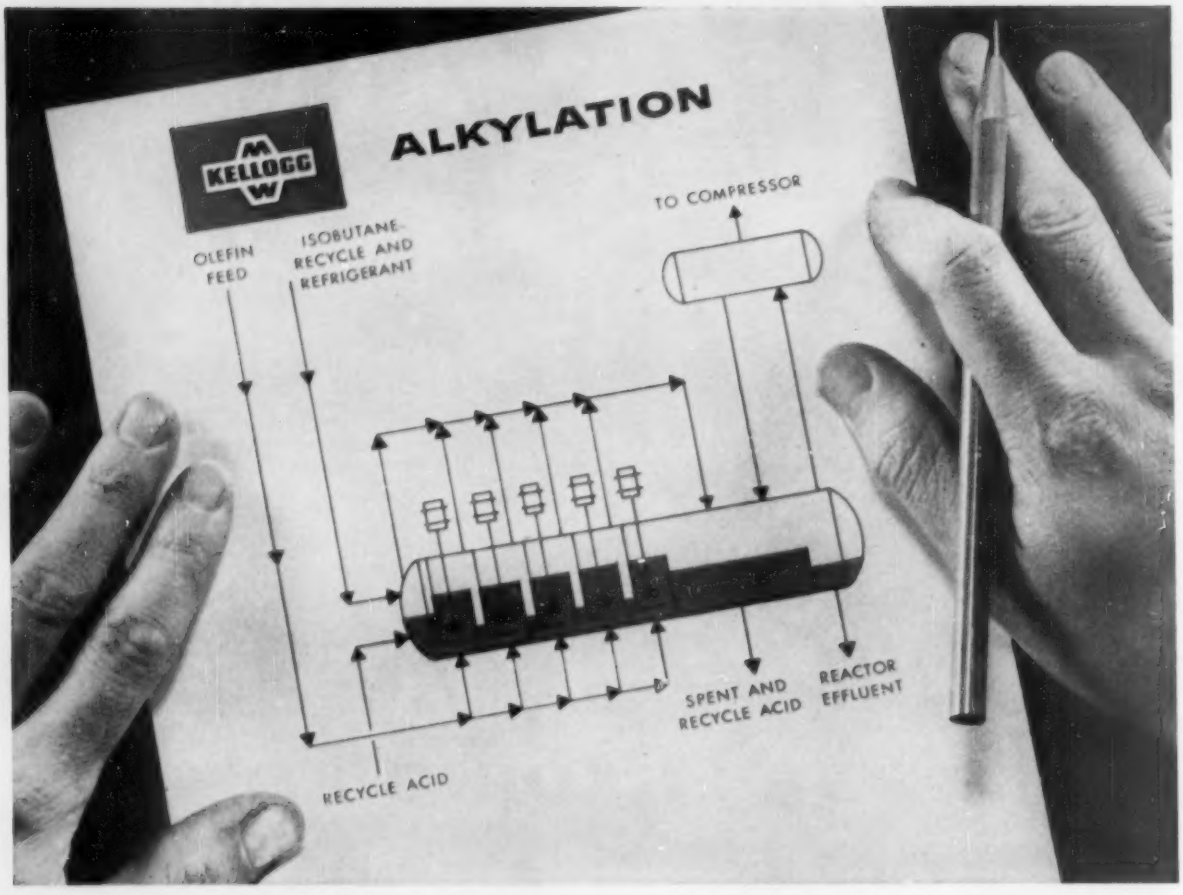
Write For Illustrated Literature, Dept. 3-5

CHIKSAN

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION fmc

CHIKSAN COMPANY — BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division) Houston 1, Texas • Chiksan Export Company • Chiksan of Canada, Ltd., Edmonton, Alta.



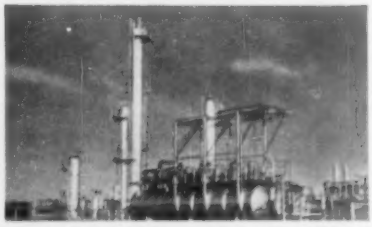
Lower Investment in Recycle Equipment with Multiple Stage Cascade Reactor

With more and more refiners expanding their alkylation capacity, attention is focussed again on the equipment economy and isobutane efficiency of M. W. Kellogg's cascade reactor as compared with earlier jet-type systems.

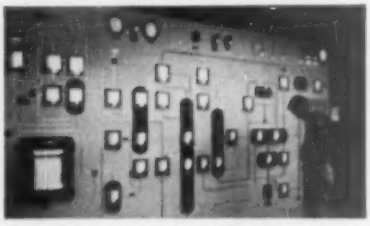
In a 2,500 BPD alkylation plant, for example, Kellogg's five-stage design reduces the number of reactors required from four to one! Instead of the approximate 12,800 BPD of isobutane recycle needed for the four individual reactors, Kellogg's single reactor requires only 4,500 BPD recycle!

In addition, the isobutane tower is reduced from 13½ to 7 feet in diameter. Exchangers, condensers, reboilers, pumps, piping, and other auxiliary equipment are proportionately smaller. And one centrifugal compressor replaces three reciprocating machines.

M. W. Kellogg welcomes the opportunity to discuss with you the improvements it is continuously making in its alkylation techniques. Recent examples are a cascade reactor with *seven* reaction zones, and the new bauxite process—developed jointly with D-X Sunray Oil Company—which reduces corrosion and fouling of fractionating units.



A recent installation of M. W. Kellogg's sulfuric acid alkylation process clearly shows the unique cascade reactor.



Control panel for units shown in the other photograph, with instruments identified by color-coded silhouettes.

Refinery Process Division

THE M. W. KELLOGG COMPANY

711 Third Avenue, New York 17, N. Y.

The Canadian Kellogg Company Limited, Toronto · Kellogg International Corporation, London

SUBSIDIARIES OF PULLMAN INCORPORATED

GUIBERSON'S FULL RANGE
of High and Low Pressure, Quick Change
UNIONS

1,000 lb. test
2,000 lb. test

4,000 lb. test
6,000 lb. test
10,000 lb. test
15,000 lb. test

Quick and easy to make or break, Guiberson's Unions are ideal for a multitude of uses... give a positive, leakproof seal, with minimum upkeep. Guiberson's low pressure unions 1" through 10" sizes have metal to metal seats, feature a convenient 3-lug wing nut.

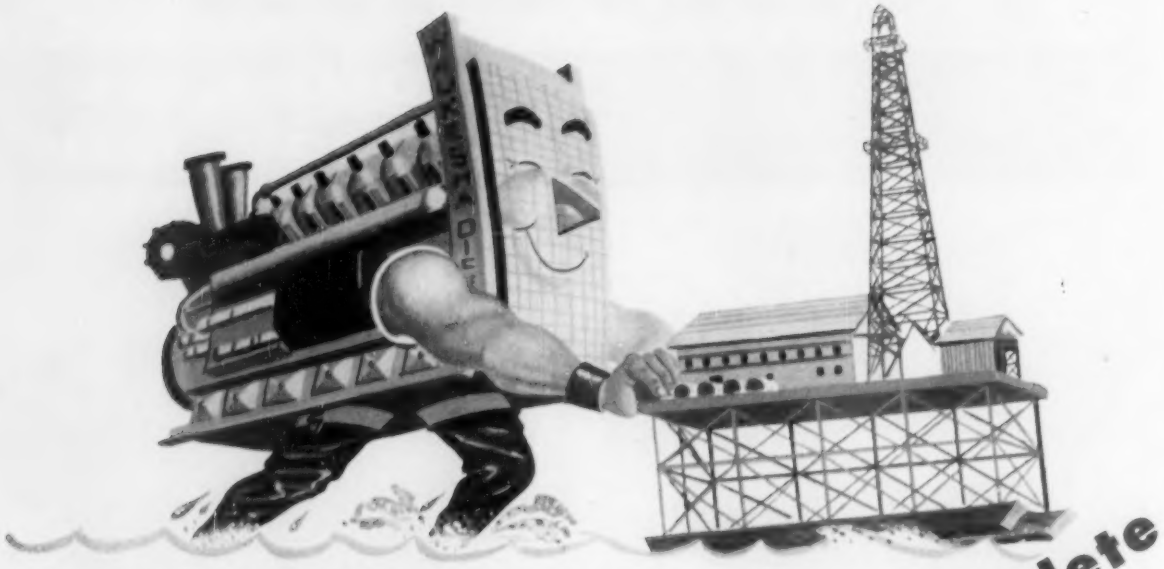
High pressure unions are made in 1" through 4" sizes. 6,000 lb., 10,000 lb. and 15,000 lb. unions incorporate the pressure-molded Seal-O-Matic Ring. All high pressure unions are forged steel.

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

Waukesha



we can supply you a complete

When designing your rigs for offshore operations specify Waukesha Diesels and buy them from Waukesha Sales & Service, Inc.

Waukesha, famous for steady, reliable power in oil fields all over the world, has a complete line of diesel engines that range in power from 1100 hp to 10 hp, especially adaptable for offshore operations.

Whether the rig is mechanical or electric there is a Waukesha engine for every specific job—from drawworks to rig lighting, from mud pumps to water pumps.

Waukesha Sales and Service, Inc. sells more oil field engines than any other distributor in the world. When you need power for your offshore rigs, let Waukesha Sales and Service, Inc. help you choose the right engine for the job—any job.

DIESEL ENGINES FROM 10 TO 1100 HORSEPOWER

Sea Power!

diesel-electric package for any rig

WAUKESHA

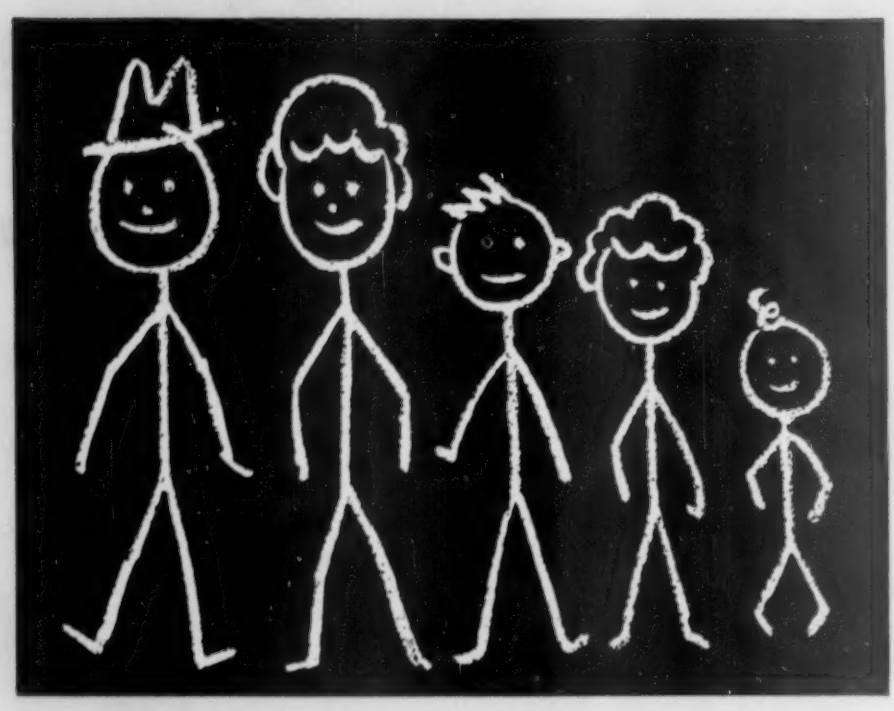
Sales & Service, Inc.

1422 MAURY ST. • HOUSTON, TEXAS

EXCLUSIVE DISTRIBUTORS FOR WAUKESHA PRODUCTS IN TEXAS, NORTH AND WESTERN LOUISIANA, SOUTHERN ARKANSAS AND NEW MEXICO

WORLD'S LARGEST DISTRIBUTOR OF OIL FIELD ENGINES

In This Family, They're Spaced Just Right!



....and in this one too!

There's one nice thing about a large family. Somebody can always be found for every job that turns up.

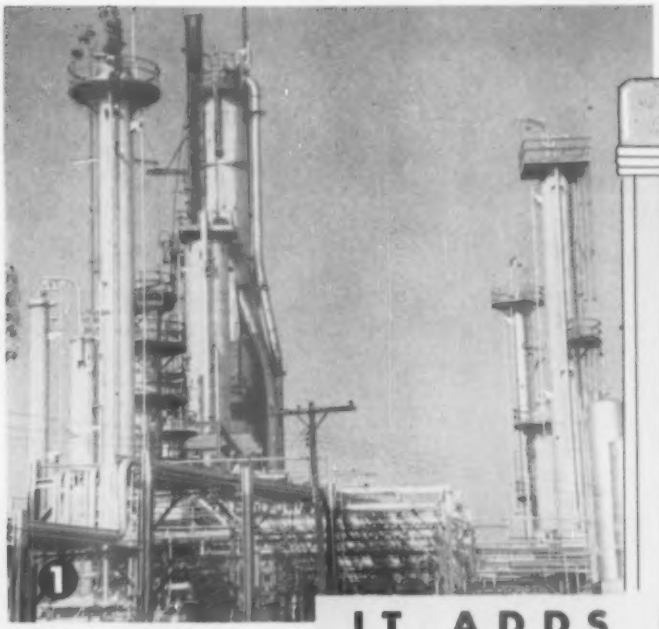
That's certainly true of Bethlehem's family of pumping units. A very large and versatile family, it covers the entire field of beam-pumping. When we call the roll, we begin with the midget 6D, the newest arrival. We finish, qu te a while later, with the huge 640. Between the two extremes is every other type ever needed for modern pumping.

The many different units are carefully graduated in size. This close graduation is important. It means that the step-up from one unit to the size just above is never illogical or awkward. Going one step higher is easy and economical for the customer; hence it's unnecessary to risk overloads with too small a unit.

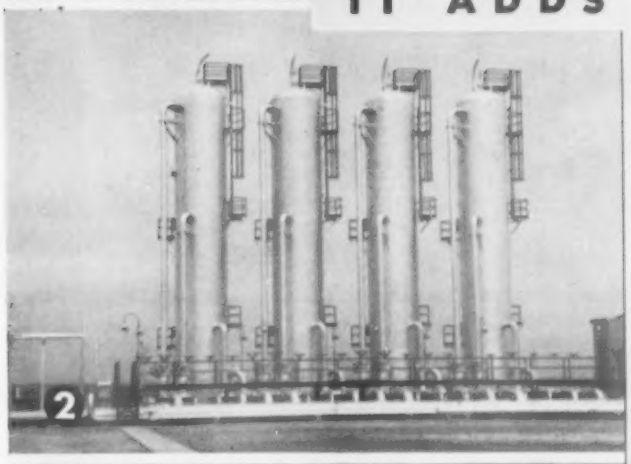
Every Bethlehem pumping unit is painstakingly engineered for stroke, torque, beam and counterbalance capacity. Every unit represents true long-range pumping economy. Ask us to furnish full details.

BETHLEHEM SUPPLY COMPANY
General Offices: 21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.
Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York, N. Y.

BETHLEHEM SUPPLY



1 Modern polymerization plant — Ardmore, Oklahoma. The vessels were furnished by McNamar.



2 9 ft. by 60 ft., 800 P.S.I. dehydrators — Built by McNamar for main line gas booster station, Spraberry, Texas.

3 Gasoline plant installation — superior design and quality — Snyder, Texas — Manufactured by McNamar.

IT ADDS UP TO . . .

Quality+

McNamar's years of experience in oil field equipment manufacturing plus their improved engineering facilities add up to a quality product worthy of your consideration. McNamar products are designed for low maintenance operation, easy upkeep and are built to withstand years of rugged usage.

Call, write or wire McNamar for further information concerning your individual needs.

★ McNAMAR TULSA

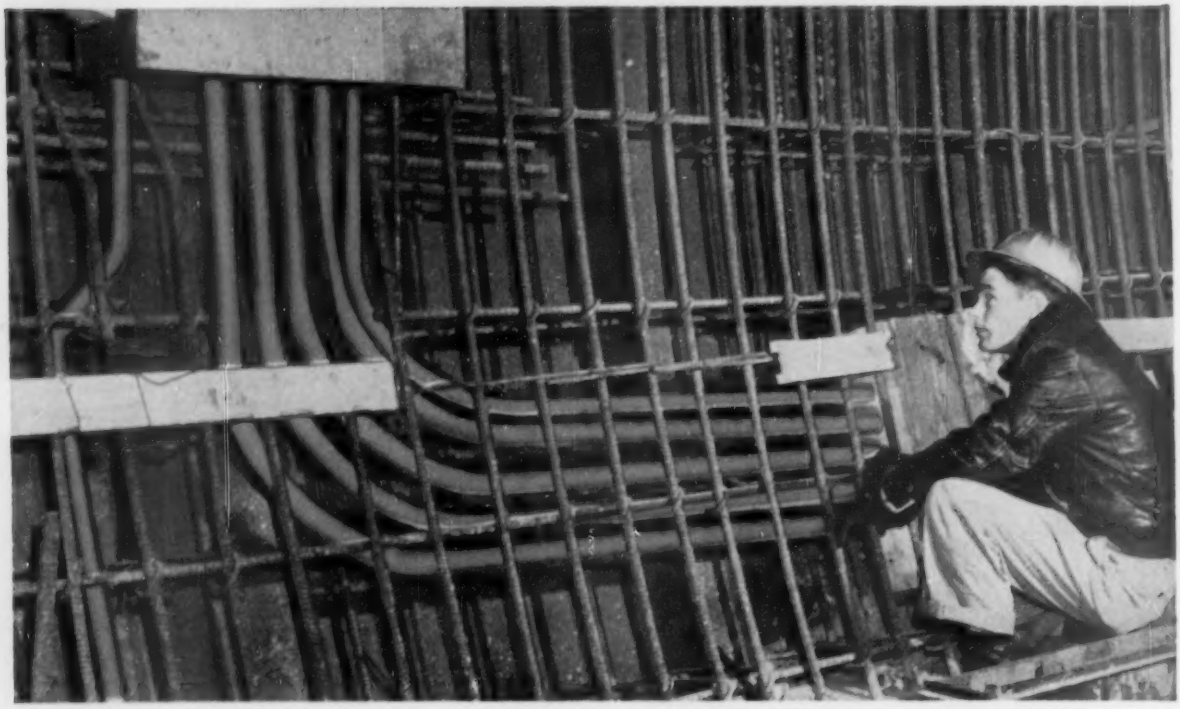
McNAMAR

BOILER & TANK CO.

BOX 868 • PHONE CHerry 2-6291

TULSA, OKLAHOMA

Power for the new 7,650-foot Baltimore Harbor Tunnel will be protected by EVERDUR Electrical Conduit



Everdur Electrical Conduit, nominal size 1¼", connecting control box to sidewalk manhole—all conduit to be embedded in concrete.

A section of Everdur Conduit in the roadbed slab protects the vital traffic control system and air duct lighting.

THE BALTIMORE HARBOR TUNNEL†, under the Patapsco River, scheduled for completion in 1957, will be the largest "trench-type" tunnel ever built. Twin-tube sections are built on dry land, launched and concreted almost to zero buoyancy, then sunk in place and joined underwater by divers.

Power for traffic signals, alarms, air duct lighting, and shaft lighting circuits for this great tunnel will be protected by Everdur® Electrical Conduit—made from one of Anaconda's copper-silicon alloys. Everdur never rusts—offers high resistance to other types of corrosion. It provides dependable year-after-year protection—wherever water and corrosive atmospheres are a problem—or where conduit must be buried or embedded in concrete. Everdur is also tough—stands up under movement and vibration.

For detailed information, write: The American Brass Company, Buffalo Division, Buffalo 5, New York. In Canada: Anaconda American Brass Limited, New Toronto, Ontario.

®Reg. U.S. Pat. Off. 56134

†Built by Maryland State Roads Commission; Merritt-Chapman & Scott Corp., General Contractors; Singstad & Baillie, Contracting Engineer; J. E. Greiner Co., Consulting Engineer.

EVERDUR ELECTRICAL CONDUIT

ANACONDA®

COPPER-SILICON ALLOYS

CORROSION-RESISTANT • STRONG • NONMAGNETIC • WORKABLE • WELDABLE

HOUSTON NATURAL GAS CORPORATION ODEM FIELD COMPRESSOR STATION—equipped with two Beaird-Ingersoll-Rand 660 h.p. 12SVG four cycle gas engine driven compressors, Young radiators, lubricating oil coolers and gas coolers, and all necessary controls. Other sizes 110 to 660 h.p.

Quick Installation –

PACKAGED COMPRESSORS SUPPLY NEEDED RESERVES

Houston Natural Gas Corporation built this compressor station in Odem Field, Texas, to boost natural gas to lines serving the expanding Corpus Christi area. Equipped with two 660 h.p. Beaird-Ingersoll-Rand 12SVG packaged units, it is capable of handling 12 mmcfd. Utilizing packaged compressors minimized field assembly and added needed reserves at a saving in both time and cost of installation.

Operating with two stages of compression, the units pick up gas from nearby wells at 50 psig. and boost it to the line at 325 psig. Automatic controls built into the compressors prevent suction pressures from being pulled below 50 psig. required for efficient operation of the separators. Flexible in design, the units can be converted to three-stage compression to follow the pressure on down as the field grows older. When reserves are depleted the compressors can be moved to other service and nearly all of the present installation salvaged for re-use at the new location.

Let us show you how complete packaging simplifies installation and reduces field assembly costs.

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

MACHINING
MANUFACTURING
STEEL WAREHOUSE

BEAIRD

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

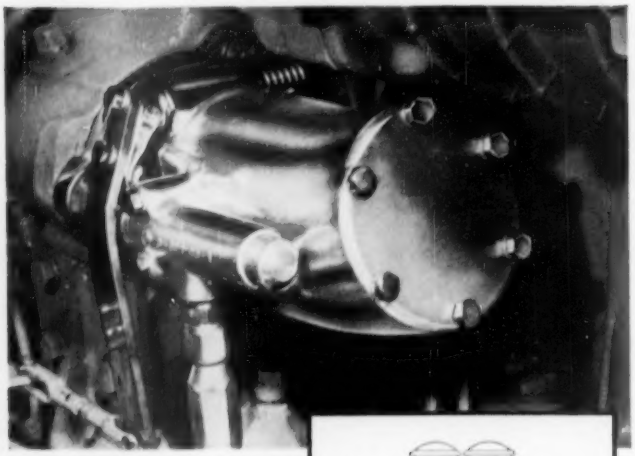
Sales offices: *Dallas, Houston, Corpus Christi and Midland, Texas; Tulsa, Oklahoma; Denver, Colorado; Los Angeles, California, and Cie. Ingersoll-Rand, Paris, France.*

It takes a jackhammer

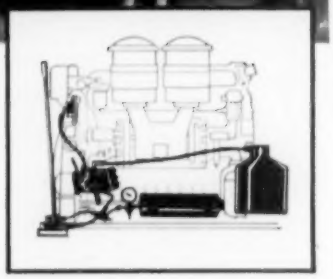
3/10 seconds to strike 10 blows

But a Hydrostarter starts a Detroit Diesel in

Only Half the Time



Heart of the Hydrostarter is this hydraulic starting motor. Other components are an engine-driven pump, accumulator, hand pump and reservoir.

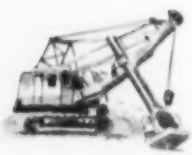


0.15 seconds is the time it takes a Hydrostarter to start a General Motors Detroit Diesel. And regardless of season—high temperatures or even at 20° below zero—you get sure, fast starts with a Hydrostarter. This hydraulic starting system costs less to maintain—costs less to operate than regular starters, sells for a far lower price than any other nonelectric Diesel starter. For full details call in your GM Diesel distributor or dealer or write direct.

DETROIT DIESEL

Engine Division of General Motors • Detroit 28, Michigan

Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 893 H.P.



AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

WHY YOU SAVE BY GETTING GENUINE FAIRBANKS-MORSE MAGNETOS and PARTS

Reduce engine maintenance and prevent shutdowns by getting magnetos and parts from your Fairbanks-Morse service station.

First, he can give you the right magneto for practically any engine — a magneto that is specially engineered to give more dependable operation, easier starting, and longer service life.

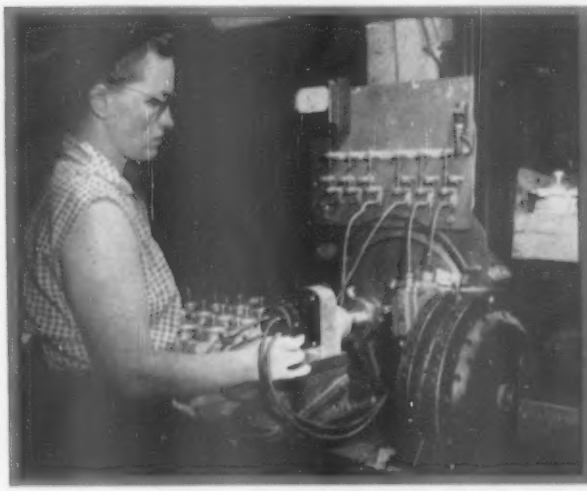
Second, you get expert repair service by trained ignition specialists from any of the 2,500 Fairbanks-Morse service stations throughout America.

Third, you get highest quality at a fair price . . quality backed by 125 years of manufacturing experience . . . quality controlled by exacting tests in every important stage of production.

Fourth, you get dependable, trouble-free parts — parts proved in millions of hours of service and in more than 3,500,000 Super-Spark magnetos used in all kinds of weather and every climate.

So, the next time you need an engine tune-up for your pump, driller, tractor, or other equipment, spend wisely by going to your nearest Fairbanks-Morse service station and asking for genuine Super-Spark magnetos and repair parts.

Fairbanks Morse MAGNETOS SALES SERVICE



Spark testing is one of many inspections in the process of manufacturing magnetos.

Fairbanks-Morse high-tension coils being wound on an automatic coil-winding machine.

MORE THAN 3,500,000 MAGNETOS IN USE.

FAIRBANKS-MORSE

A name worth remembering when you want the BEST

MAGNETOS • REWIND STARTERS • WATER SYSTEMS • GENERATING SETS
PUMPS • MOTORS • SCALES • DIESEL LOCOMOTIVES AND ENGINES

Fairbanks, Morse & Co., Magneto Division
Beloit, Wisconsin

Gentlemen: Please send the name of your nearest authorized service station.

Your Name_____

Company Name_____

Address_____

City_____ Zone_____ State_____

ROCKFORD

FIRST

Using a new type friction material of recent development, ROCKFORD was the FIRST to engineer these new materials into MORLIFE Clutches and Clutch Plates. They reduce clutch size and engaging pressure, operate longer without adjustment or plate replacement — and avoid down-time caused by burned or warped plates in heavy duty tractors, trucks, tanks, cranes, power units, shovels, bulldozers, earth movers and other heavy duty machines.

MORLIFE* CLUTCHES and CLUTCH PLATES

*TRADE MARK

"MORLIFE clutch has gone 851 hours without slipping or adjustment."

"MORLIFE clutches last 950 hours longer, without adjustment."

"MORLIFE clutch needs adjustment once a month, instead of daily."

"MORLIFE requires lighter handle pull and one tenth the adjustments."

"MORLIFE clutch going strong after 1695 hours, working in sand."

"MORLIFE pulls harder and lasts six to ten times longer."

400% MORE LIFE

100% MORE TORQUE

50% MORE HEAT RESISTANCE

Before you approve specifications for your next models, it will pay you to investigate how MORLIFE Clutches will add to the service life of your product and reduce the number of stops for adjustments and repairs. It also will pay you to recheck specifications for your present models. For information covering operating characteristics, write Department E.

ROCKFORD Clutch Division BORG-WARNER

1305 Eighteenth Avenue, Rockford, Illinois, U.S.A.

CLUTCHES

JONES

SUCKER RODS

last longer!

LOOK FOR THE GREEN RODS

Expect more from Jones and GET IT!

For over 60 years, producing companies have looked to Jones for the best in sucker rods...for the many improvements in design and utility ...for service and satisfaction.

And, for over 60 years, they have learned to depend upon Jones. It's a good habit we have developed and one we intend to keep. If what you are using doesn't come up to your expectations, try Jones.

Run several strings and see for yourself. They're stocked close by most fields.

P·E·S·A

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

PARTNERS IN PETROLEUM PROGRESS

THE S. M. JONES COMPANY *Division of Buffalo-Eclipse Corporation*

General Office and Factory: **TOLEDO, OHIO** Sales Office: Kennedy Building, **TULSA, OKLAHOMA**

Export Sales Representatives: IDECO – Division of Dresser Equipment Company, Republic National Bank Building, Dallas, Texas and Chanin Building, New York City

Speeds drilling under water with **DENISON** hydraulic equipment

SIXTEEN HOLES—90-feet deep—in only eight hours. That's the footage this barge-mounted shot-hole rig drills using Denison Pump/Motors and Denison Valves.

A Denison Pump/Motor powers the hydraulic system for this major oil company rig. Two additional Denison Pump/Motors rotate the drill and control pull-down of the rotary table. Accurate, fingertip control is provided by Denison hydraulic valves.

The hydraulically operated marine rig drills faster . . . is more dependable, easier to maintain than mechanically driven rigs.

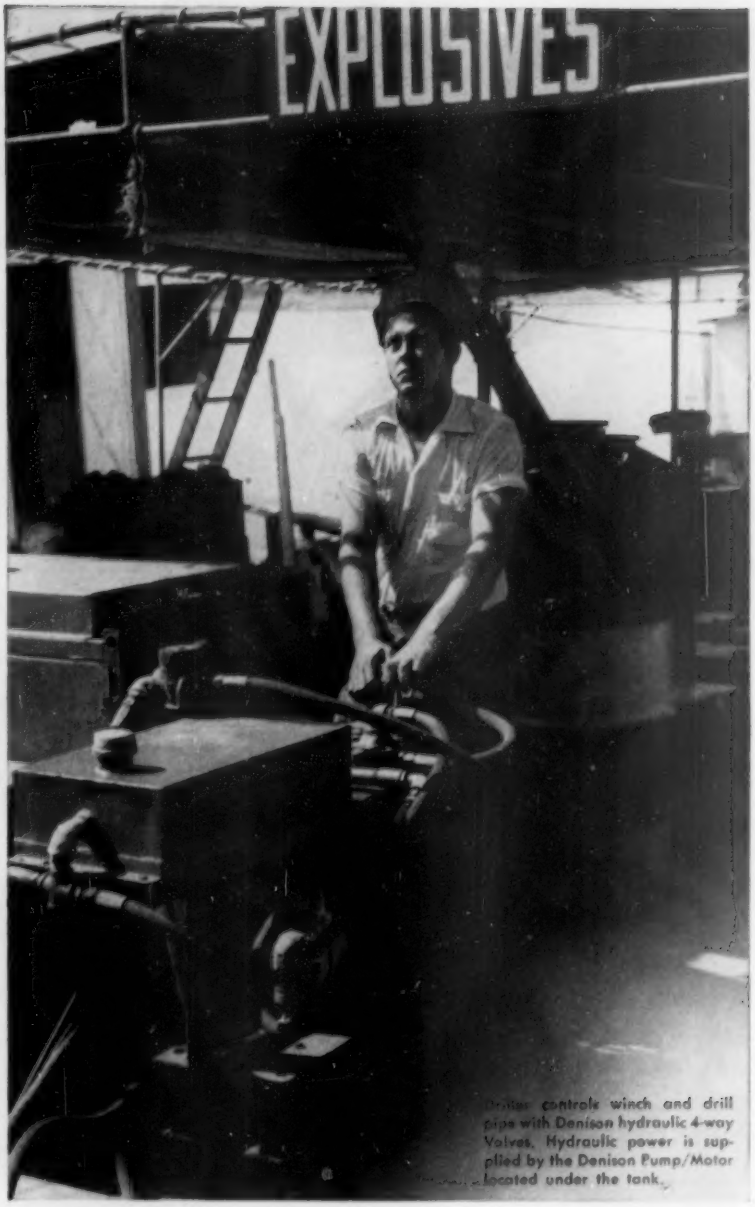
Since the shot-hole crew paces the exploratory drilling team, it will pay you to take advantage of Denison's experience in hydraulics to speed drilling on land or under water. Write to:

THE
DENISON ENGINEERING COMPANY
1176 Dublin Road • Columbus 16, Ohio

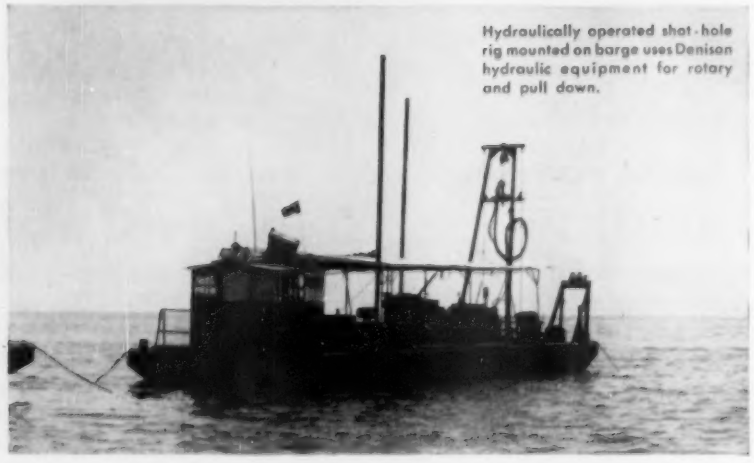
A Subsidiary of American Brake Shoe Co.
Branch Offices at:
2501 Bartlett St., Houston 6, Texas
4714 E. 22 Place, Tulsa, Oklahoma

DENISON Hydr OIL ics

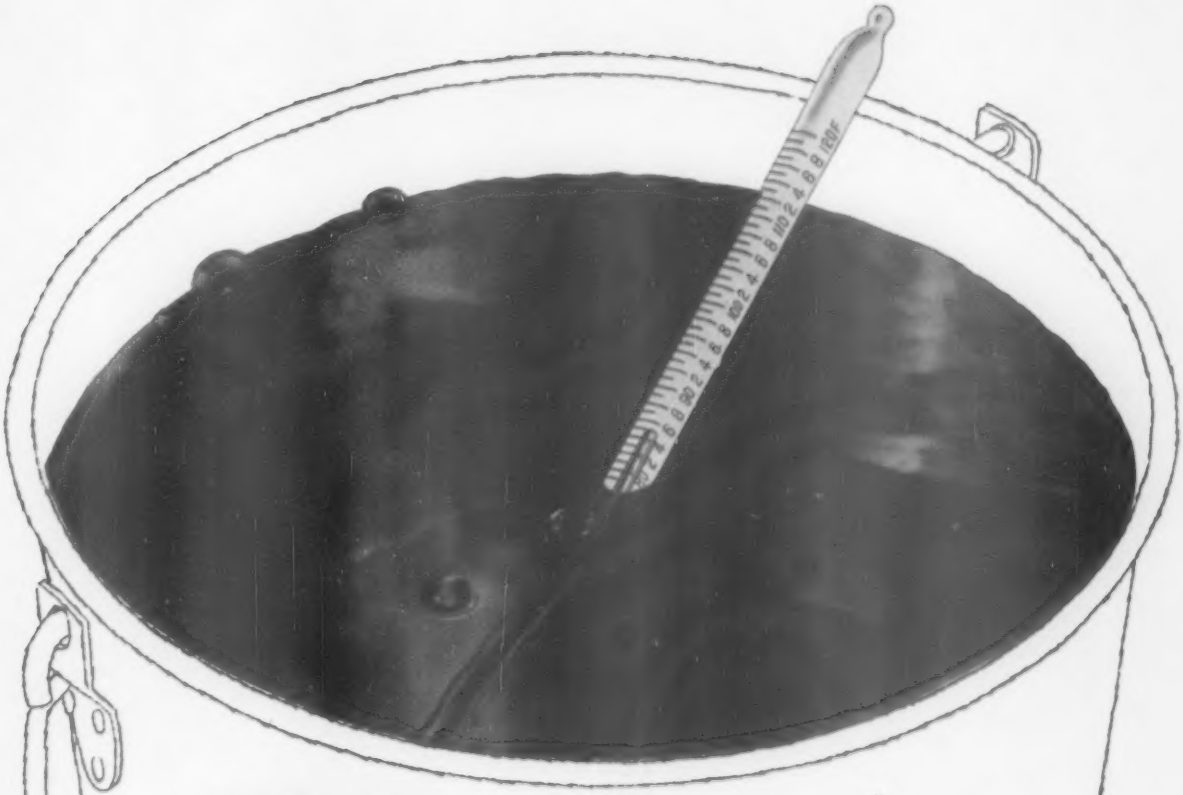
HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS



Denison controls winch and drill pipe with Denison hydraulic 4-way Valves. Hydraulic power is supplied by the Denison Pump/Motor located under the tank.



Hydraulically operated shot-hole rig mounted on barge uses Denison hydraulic equipment for rotary and pull down.



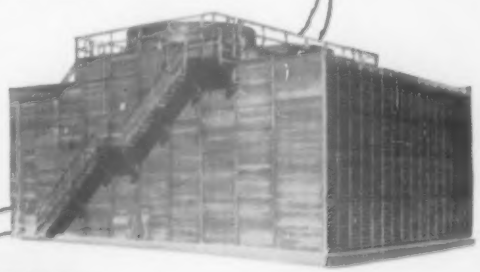
This *is what you buy...*

When you invest hundreds of thousands of dollars in a cooling tower, what you are actually buying is the tower's consistent ability to deliver *cold water* at specified temperature and volume . . . at an economical price per gpm.

And because actual performance is an "unknown" until the tower is in operation, you purchase cooling towers largely on faith in the manufacturer.

You can place your absolute confidence in The Marley Company's ability to deliver the cold water you specify. At Marley, water cooling has been an exclusive specialization—not a sideline—for 35 years. Every company facility — design, research, engineering, production — is devoted 100% to the science and techniques of water cooling. This single-minded approach to water cooling problems has resulted in Marley's undisputed leadership in the water cooling field by any standards you care to apply.

The Marley Company, however, does not ask you to buy its cooling towers on blind faith. Rather, Marley urges every industrial tower owner to test his tower and has paved the way by developing the simplest and most authoritative tower-testing procedure. And finally, every Marley cooling tower, from the moment it starts, receives the benefit of professional observation and inspection by Marley field engineers — specialists in maintaining both tower function and tower structure in excellent condition.



MARLEY

The Marley Company

Kansas City, Missouri

SEEING THE UNSEEN!

From Tuboscope research has come a line of new instruments, new techniques, new ways to **see the unseen.** Tuboscope research is closely coordinated with field practice. There are no prima donna instruments to fail and tie up your operation. Tuboscope builds for the oil fields and builds to reduce the unnecessary cost of breakdown in tubular goods.
Tuboscope can be depended on to bring the best in new methods of non-destructive testing of oil field tubular goods.

Tuboscope COMPANY

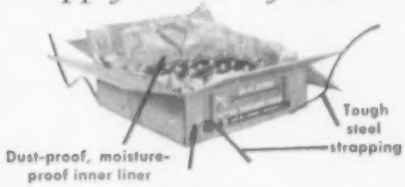
2400 HOLMES ROAD • HOUSTON, TEXAS

Link-Belt maintains the broadest stocks and most complete distribution in the field. And Link-Belt warehouses at strategic points back up distributors —assurance that drillers will be served promptly.

Why LINK-BELT API (SS type) chain goes to work in FACTORY-FINISH CONDITION

Triple-protected—

it's available at leading supply stores everywhere



IF exposed to dirt, grit and moisture, inadequately-packaged chain may leave part of its life in the tool shed. That's why Link-Belt API (SS type) chains are so carefully boxed—to give you *all* the quality, durability and precision you pay for . . . to protect the accuracy, finish and manufacturing refinements built into the most widely used API chains in the field.

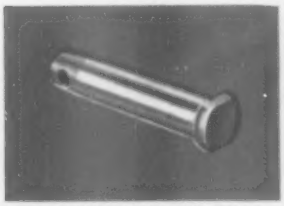
Link-Belt boxes are steel-strapped to resist rough handling. The easily-identified fiber carton with no exposed seams is impervious to even the finest sand. And a sturdy inner lining further prevents chain from punching through.

Large stocks of Link-Belt SS-type chains are available everywhere. For the complete story get Book No. 2680. And for prompt, expert service, call your nearest Link-Belt office or any leading supply store.

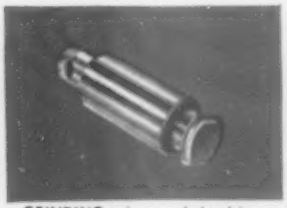
LINK-BELT

CHAINS AND SPROCKETS

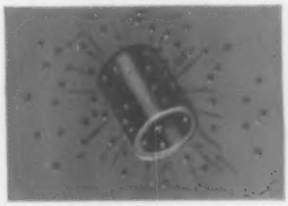
FOUR OF MANY "EXTRAS" YOU GET AS STANDARD ON LINK-BELT API CHAIN



CADMIUM-PLATED PINS. Finish prevents rust, avoids failures due to corrosive fatigue.



GRINDING pins and bushings (*all* contact surfaces) eliminates wear-producing irregularities.



SHOT-PEENED rollers hammered by tiny steel balls have added impact resistance.

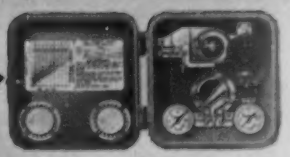
COTTERS with patented grooved shank fit tightly in pin hole. Pin is easily removed.

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Shreveport, La., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.

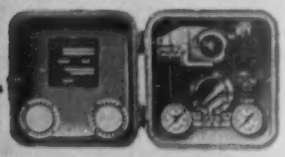
FISHER
LEVEL-TROL

The Answer to Your Liquid Level Needs

TYPE 2598—Level-Trol cage unit with 2" 600 lb. flanged top and bottom equalizing connections (F-1).

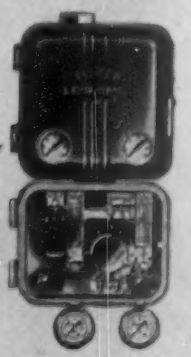


TYPE 2500—proportional pilot for general liquid level control applications.



TYPE 2500T — Level-Trol pilot used as pneumatic level transmitter.

TYPE 2500C—pilot with level indicator. Indicator available on all style Level-Trol pilots.



TYPE 2500 — 2516 dual Level-Trol pilot consisting of Type 2500 for remote level-indication or recording and Type 2516 controller with proportional and reset response.

The wide variety of pilots available for mounting on the Level-Trol gives further evidence of the Level-Trol's ability to handle practically any liquid level, interface level, or specific gravity control or indication problem.

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WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

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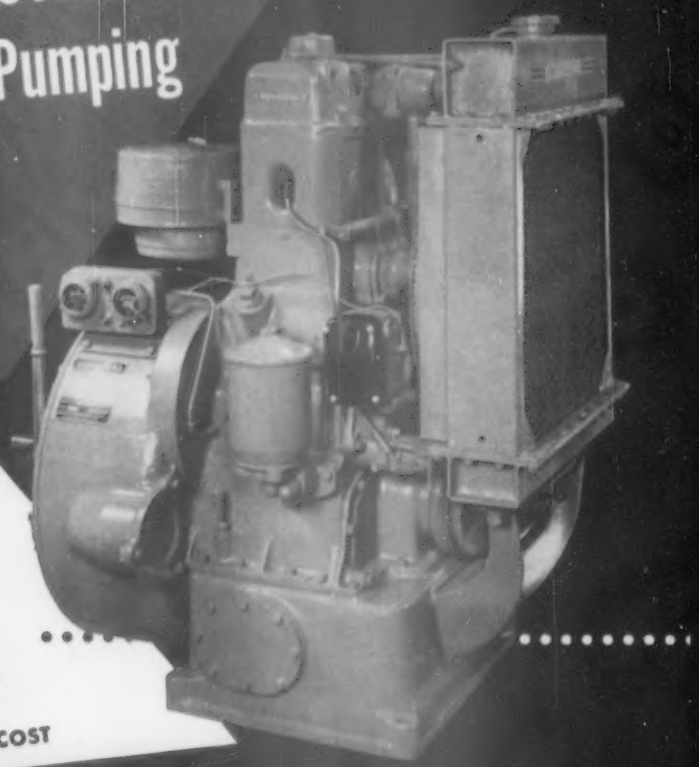
OVER 31,000 HOURS OF CONTINUOUS OPERATION WITHOUT AN OVERHAUL

. . . a typical Production Pumping record for



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Over 31,000 hours of continuous operation with the original rings, piston, liners, bearings and crankshaft still in place . . . this is typical of the service histories of many Nordberg Power Chief engines now on rugged round-the-clock production pumping schedules.

With their heavy duty construction, Power Chief engines deliver smooth, steady performance—no surging or laboring during the power stroke which saves wear on clutch, V-belts and pumping unit gears.

These features alone mean more "money in the bank" when you use Power Chief Engines. Add to this the many "extras" that are included as standard equipment and you will see why you save by specifying "Power Chief".

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TO GET WHAT YOU WANT
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WHEN YOU NEED IT...
AT REASONABLE
COMPETITIVE PRICES

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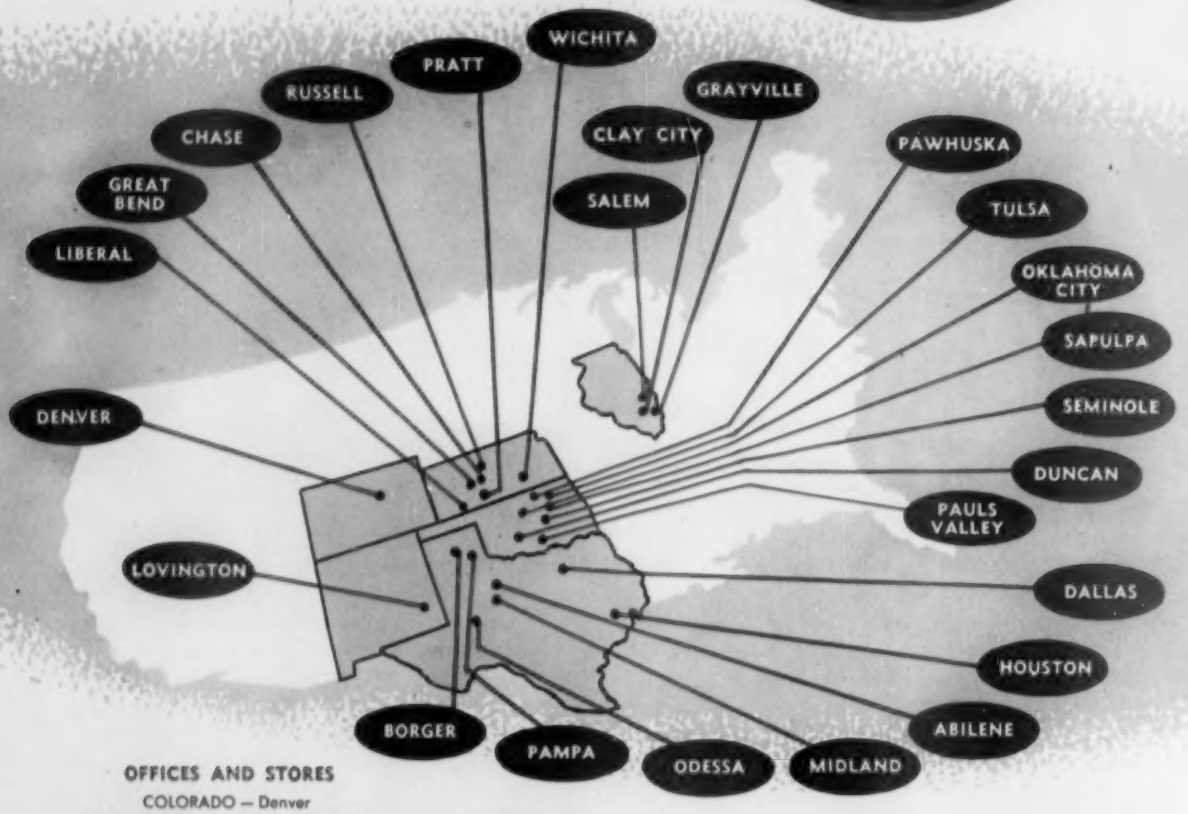

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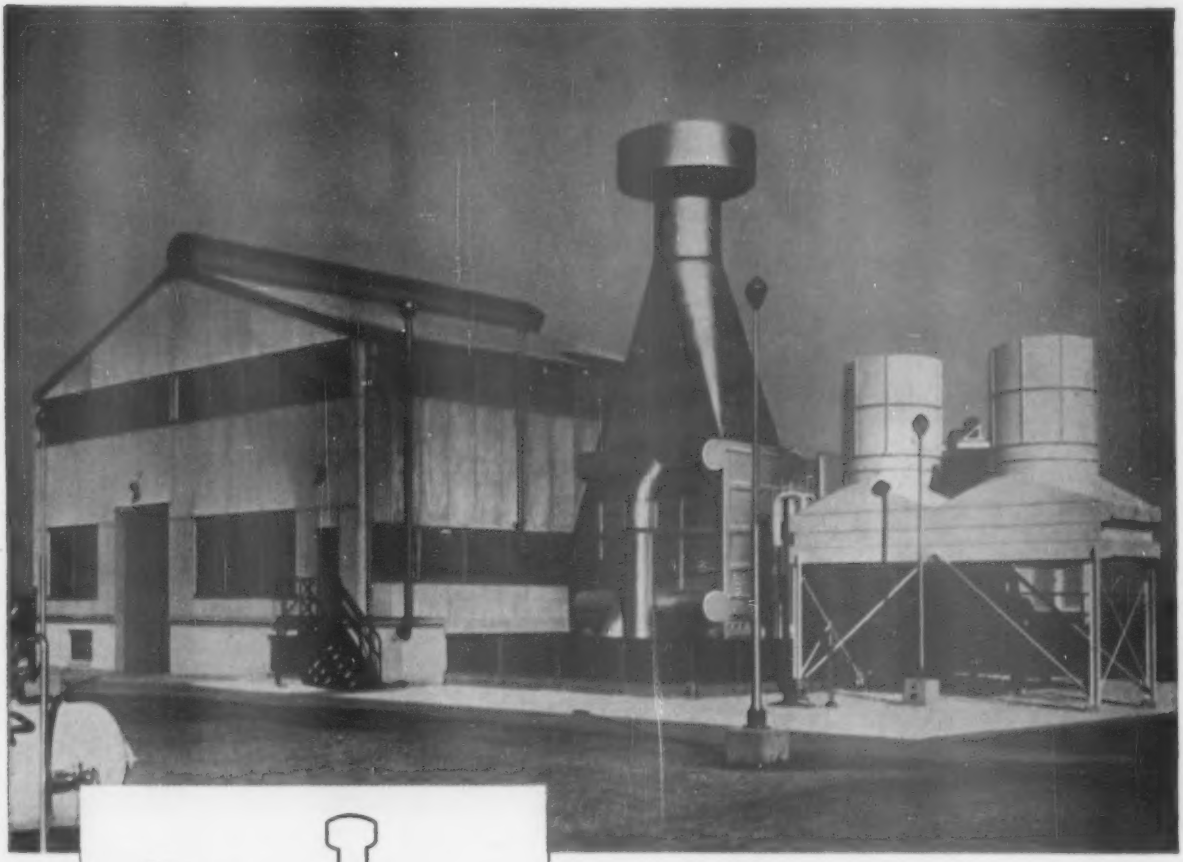

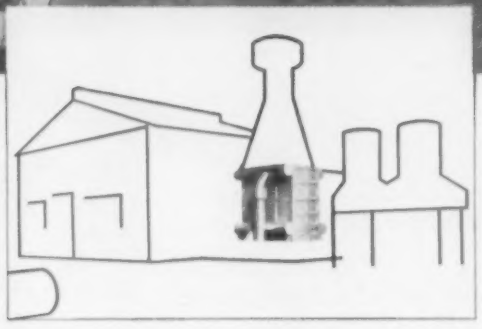

This is the Trunkline Gas Company's Edna Compressor Station with a Pin-Fin installed. Note the compactness of this regenerator.

* Specially designed "pin-like" shapes, which project inside the heat transfer core, give the new Air Preheater Pin-Fin its name. Their unique, patented design greatly extends heat-transfer surface area.

New Pin-Fin users are:

Tennessee Gas Transmission Co.	1 unit
Trunkline Gas Co.	3 units
Texas Eastern Transmission Corp.	6 units

NOW...economy in gas-turbine cycles with Air Preheater's new Pin-Fin* Regenerator

To compete commercially with Diesel engine steam-turbine and gas-engine cycles, a gas turbine must normally include a heat exchanger. And the most efficient unit for this service is Air Preheater's Pin-Fin—the new, extended-surface heat exchanger.

For example, a 75%-effectiveness Pin-Fin Regenerator in a gas-turbine cycle at 6-to-1 pressure ratio and a turbine inlet of 1500°F. will reduce fuel consumption by approximately 32%.

Air Preheater Pin-Fin Regenerators have been in service up to five years with no major maintenance problems. For details, call or write the Air Preheater Corporation.

MECHANICAL ADVANTAGES OF THE PIN-FIN

- Compact
- Lightweight
- Quickly erected
- Minimum maintenance
- Convenient, one-unit design
- Readily disassembled

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

This is an announcement
of a brand new
Refining Process developed by
Universal Oil
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PEN

PENEX offers these advantages:

1. Provides a high octane product with high volatility.
2. Upgrades natural gasoline and light refinery products.
3. Affords mild, continuous operation—maximum simplicity.
4. Clean reaction—insignificant loss to by-products.
5. Economy, both in original investment and day-to-day operation.

PENEX is an entirely new refining process which enables the refiner and natural gasoline manufacturer, for the first time, economically to upgrade his pentane and hexane fractions. It is a simple, continuous process that does not require regeneration, and utilizes a fixed-bed platinum-containing catalyst.

PENEX

TRADEMARK

PENEX converts the low octane straight chain pentanes and hexanes into the much higher octane iso-compounds, accomplishing this through a clean reaction with little or no loss to by-products. Unconverted portions of the feed stock are separated and recycled to provide the ultimate in octane improvement. This new process employs mild operating conditions, and the non-corrosive nature of the catalyst assures easy and long-sustained operation.

PENEX is available NOW!

PENEX is an important advancement in petroleum refining technology. It is ready to be put to work now. All refiners, everywhere, should investigate this new process fully either for early application or for consideration as part of their future planning.

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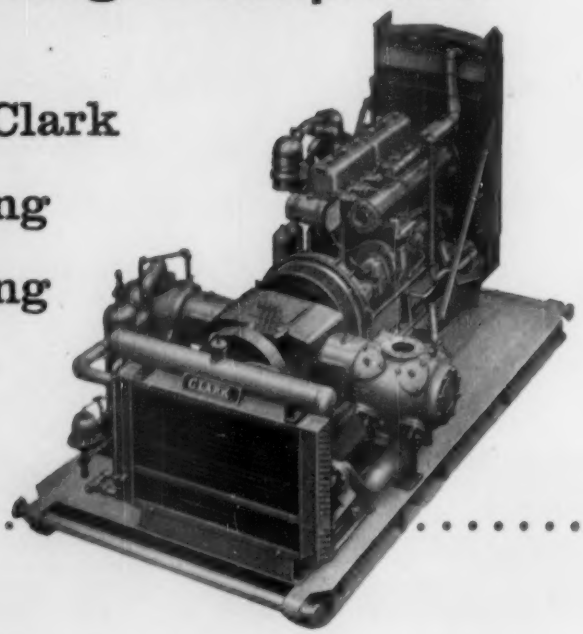
Forty Years Of Leadership In Petroleum Refining Technology

NOW... a compact 75-200 bhp Packaged Compressor

Designed by Clark for gas lifting or gathering



FEATURES

BALANCED/OPPOSED COMPRESSOR DESIGN
Virtually vibrationless . . . a couple of yards of concrete will level it.

DIRECT CONNECTED
Eliminates belts or gear drives.

ONE PIECE SKID
Only 7' 3" x 15', rigid heavy "I" beam construction.

CONSERVATIVE PISTON SPEED
Lower than on most Clark stationary compressors.

HEAVY DUTY RADIATOR
Straight finned tubes. Easy to inspect or clean, inside or out.

FACTORY ASSEMBLED AND TESTED
No field assembly. Shipped as a complete unit.

STANDARD ENGINE DESIGN
Five makes of proved engine designs available.

APPLICATIONS
Use it for gas lifting, gas gathering, gas boosting, pipeline testing, recycle plant feeders, other field services.

You asked for this field compressor—as rugged, compact and perfectly balanced as the famed "Midget Angle" but of half the horsepower.

Now you have it, in the new Clark Model CFA. Rated at 75-200 bhp , this packaged unit is ideal for gas lifting or gathering.

The CFA uses a new specially designed 5" stroke Balanced/Opposed compressor directly connected to a standard design gas engine. The compressor and engine, together with radiator, scrubber, etc., are mounted on a rugged steel skid measuring only 7' 3" x 15'.

The CFA is virtually vibrationless in operation because of its Balanced/Opposed action. In most cases the small amount of concrete used to level the unit will provide ample support. Direct drive eliminates the need for cumbersome belts and gears.

Easily and speedily transported on an average size truck, this new field compressor can also be operated on truck or floating barge.

The CFA is factory assembled, tested and shipped as a complete unit. Because of standardization the CFA can be shipped from stock in most instances.

There is a Clark CFA specialist in your area to give you all the facts. If you require greater horsepower, ask him about the Clark HMA and HMAB.

CLARK BROS. CO., OLEAN, N. Y.
ONE OF THE DRESSER INDUSTRIES
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CFA now on tour

—in Oklahoma, Kansas, Colorado, Texas and Louisiana.

Watch your newspaper for date and location of demonstration.

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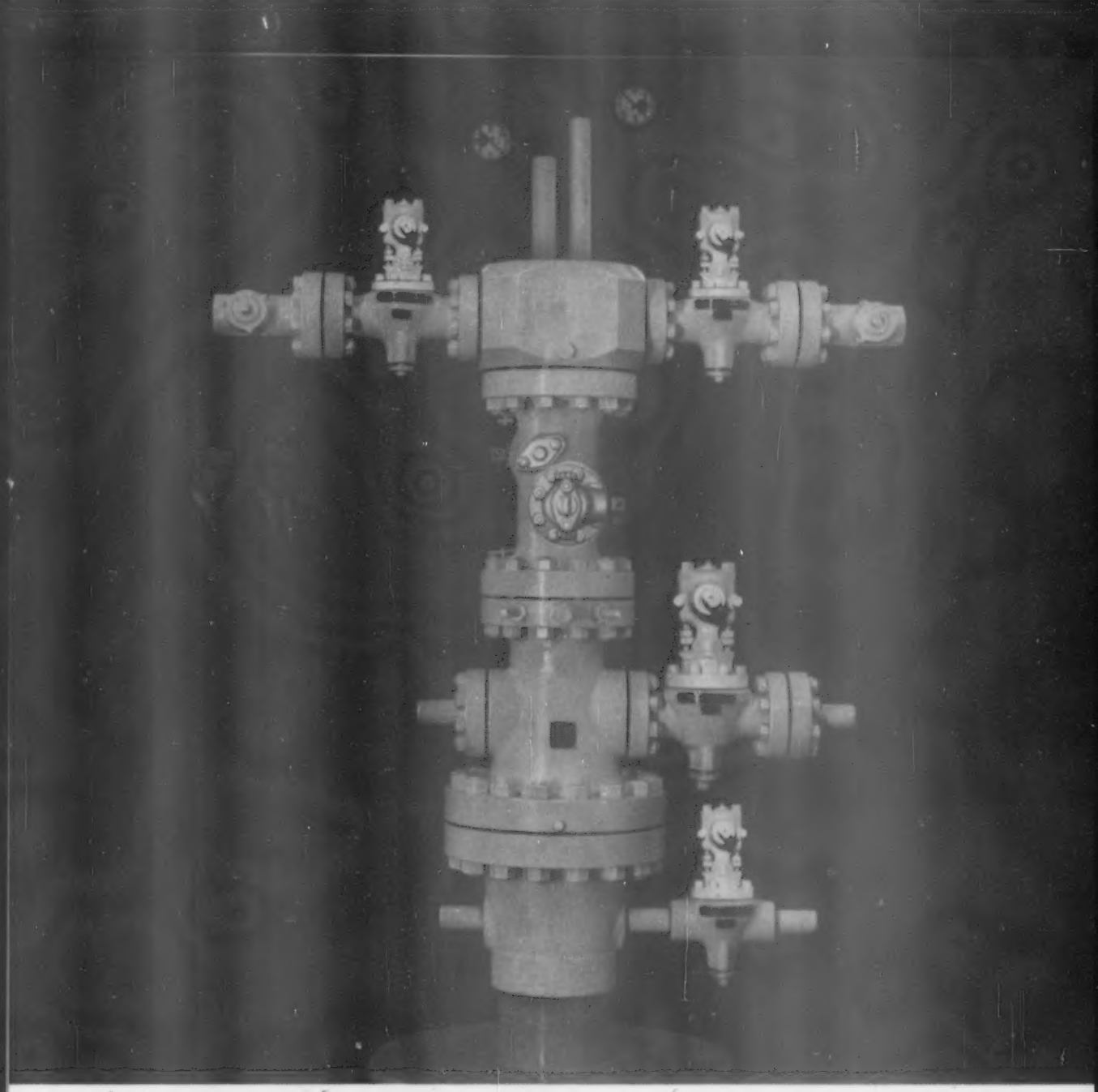
Packaged Compressors



Two Wells For The Price of One?

No not quite, but the economic advantage of producing from two zones simultaneously in a single well is obvious—and Cameron "DC" (Dual Completion) equipment is the most dependable protection for any producing condition.

To insure potential profits, do as thousands of successful operators have done—rely on the Cameron Closed-Pressure Method of Well Completion for utmost protection during this critical stage.

Cameron, the pioneer in multi-zone completion equipment, has now applied the many dependable features of the Closed-Pressure Method to the remarkable "DC" tree for parallel tubing strings. Suspension is completely versatile, permitting any work on either zone independently. Triple seals are the most advanced in the industry. The unique Cameron Non-Lubricated Master Valve employs the famous Lift-Plug components which may be replaced for a complete overhaul without removal from the tree and, of course, require no lubricants. The "DC" tee and caps permit every known operation to be performed with an absolute minimum of work.

Write or call to make an economical, flexible, complete completion.

Cameron

IRON WORKS, INC.

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Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Time & Life Bldg., New Bond Street, London W. 1 England.

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For Petroleum Pumping and Processing

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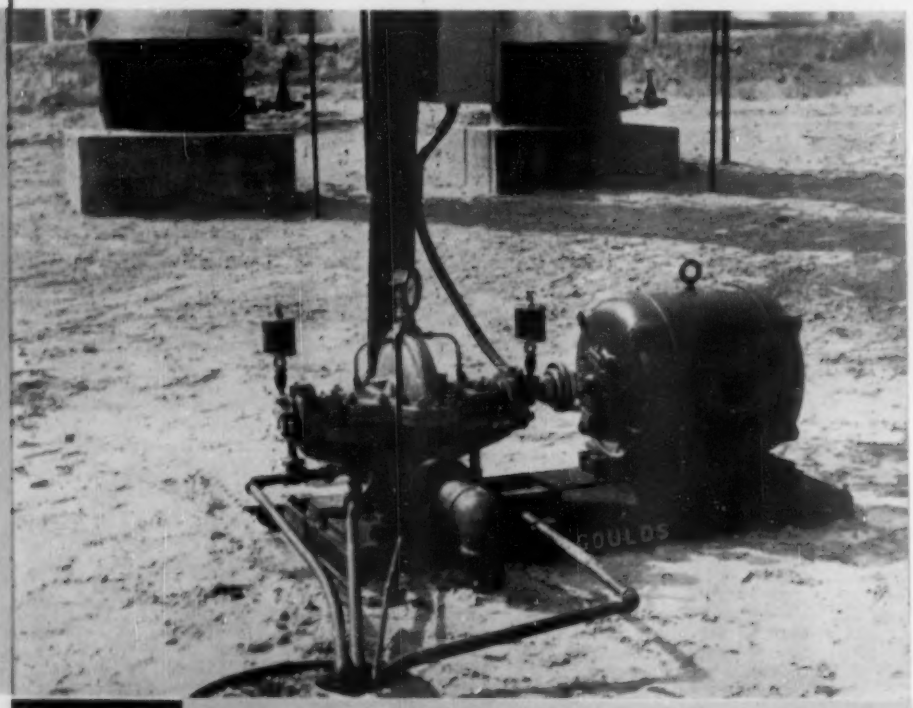
There's a complete line of Century Motors engineered and built to withstand the tough requirements of the oil producing and refining industries.

Performance-Rated Century Motors are available with Weather-Gard frames which protect against rain, snow, sleet and falling objects—and with screens to keep out rodents.

Totally Enclosed and Explosion Proof Types are available for dusty and explosive atmospheres... and you have a wide range of choice in starting and running characteristics to meet your needs. Check with your supply store, or Century branch office.

At Kilgore, Texas, this 25 HP Century Motor drives a sump pump at production battery on townsite wells.



Write for your copy of Century's Oil Industry Bulletin 14-141-P1.

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NEW-Dodge offers you a complete line of tandem-axle models

New Dodge bogie unit guarantees you maximum payload capacities!

Now you can get Dodge dependability and low operating costs in a complete line of rugged, all-new six-wheelers.

Capacity ratings range from 25,000 to 46,000 G. V. W., rear-axle capacities from 22,000 to 38,000 lbs.

High-power V-8 engines—from 201 to 220 hp.—give you more than enough power to haul the heaviest loads easily, speedily, safely.

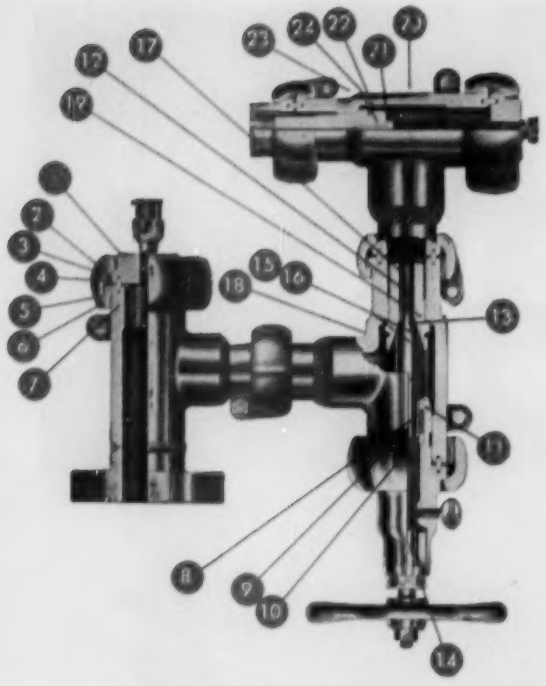
"Walking-beam" bogie keeps all eight rear tires in contact with ground at all times, minimizes bounce, increases tire mileage.

See these new V-8 Dodge tandems. Check them out against any other make and discover why they top the industry.

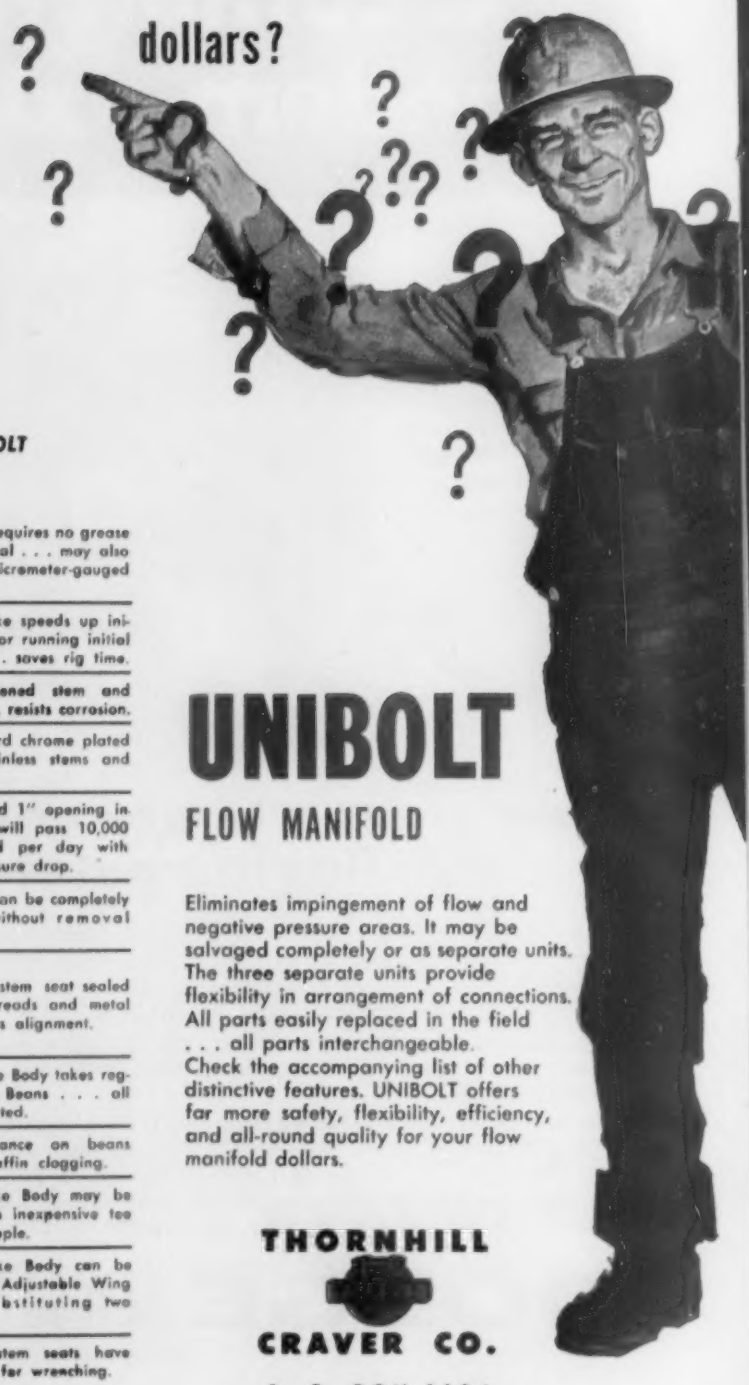
GET YOUR DODGE DEALER'S DEAL BEFORE YOU DECIDE

DODGE Job-Rated TRUCKS

WITH THE *FORWARD* LOOK



Are you getting all of these important features for your flow manifold dollars?



These are the "Extras" that make UNIBOLT the best buy of all manifolds

1	Tee cannot be accidentally opened.	13	Wing Valve requires no grease to effect a seal . . . may also be used as micrometer-gauged flow bean.
2	No exposed threads . . . no accidental damage.	14	Variable choke speeds up initial clean-up or running initial flow tests . . . saves rig time.
3	Concealed seat in groove . . . no accidental damage.	15	Nitride hardened stem and stem seat . . . resists corrosion.
4	All metal seat . . . not effected by high or low temperature.	16	Choice of hard chrome plated or "SA" stainless stems and seats.
5	Lubricators, bottom hole pressure adapters, and valves easily attached to Unibolt connection.	17	Unrestricted 1" opening in Wing Valve will pass 10,000 bbls. of fluid per day with 100 lbs. pressure drop.
6	2"—3000 lb. wp Unibolt 28% stronger than 2"—ser. 900 flange.	18	Wing Valve can be completely overhauled without removal from tree.
7	Unibolt stronger than tubing threads . . . ideal for working trees with welded lift nipple. Tubing threads in tee if desired.	19	Wing Valve stem seat sealed by power threads and metal gasket assures alignment.
8	Stem packing needs no tightening.	20	Positive Choke Body takes regular or "X" Beans . . . all beans flow-rated.
9	Stem turns freely under high pressures.	21	Shaped entrance on beans prevents paraffin clogging.
10	Threads on stem not exposed to external or internal damage.	22	Positive Choke Body may be replaced with inexpensive tee and cage nipple.
11	Full 2½" pilot for true stem alignment and rigidity.	23	Positive Choke Body can be converted to Adjustable Wing Valve by substituting two parts.
12	Streamlined flow — no obstructions . . . no turbulence.	24	Beans and stem seats have external hex for wrenching.

UNIBOLT

FLOW MANIFOLD

Eliminates impingement of flow and negative pressure areas. It may be salvaged completely or as separate units. The three separate units provide flexibility in arrangement of connections. All parts easily replaced in the field . . . all parts interchangeable. Check the accompanying list of other distinctive features. UNIBOLT offers far more safety, flexibility, efficiency, and all-round quality for your flow manifold dollars.

THORNHILL CRAVER CO.

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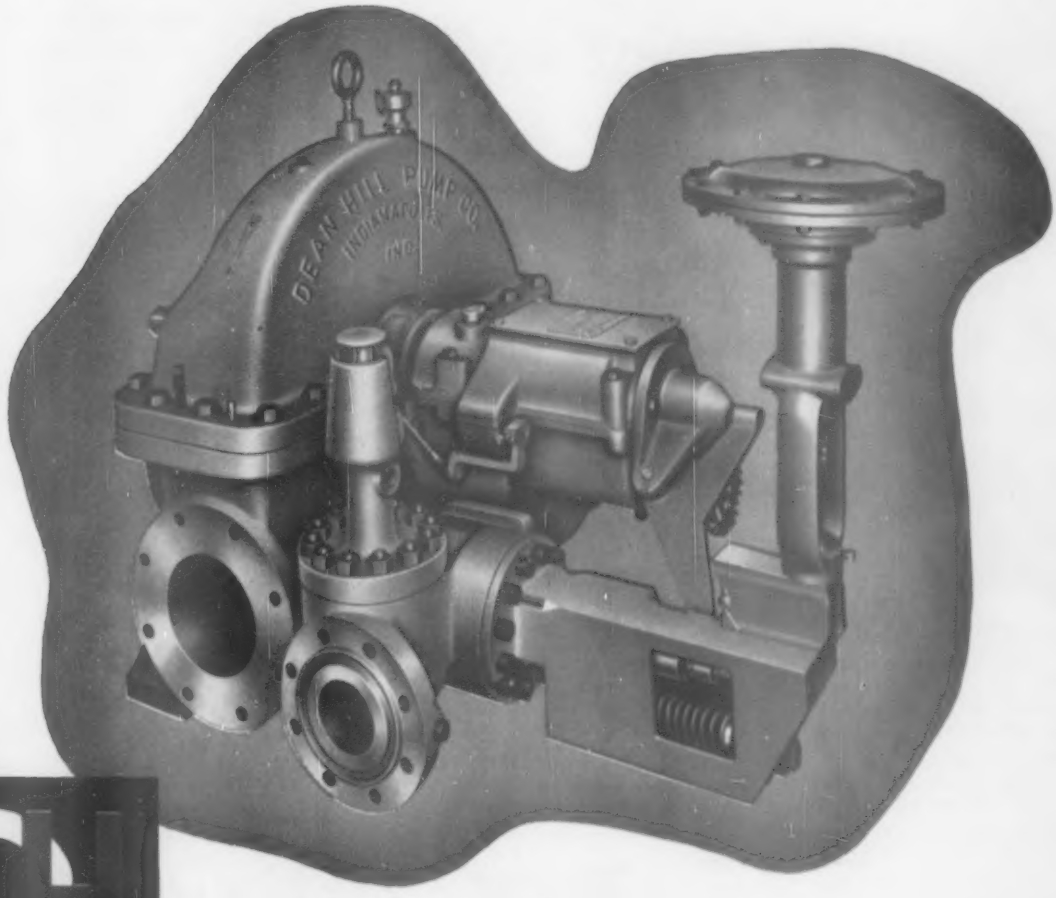

D-H turbines with pressure regulators solve constant fluid pressure problems

Dean Hill Turbines equipped with pressure regulators are "made to order" for boiler feedwater applications requiring precise, automatic pressure control. Regulators can be used with any turbine model of either horizontal or vertical design and are furnished with direct-acting or remote control. They can be arranged to maintain a constant pump discharge pressure or a constant differential pressure over the boiler pressure.

The regulator controls all turbine speeds up to normal rating, but above this point the turbine governor overrides the regulator to prevent overspeeding. The emergency trip valve remains independent.

To effect maximum efficiency of control and eliminate lost motion and deflection, the regulator is mounted on a rugged support made of welded six-inch channels.

For further information on D-H Turbines and optional accessories

write today for Catalog 500.

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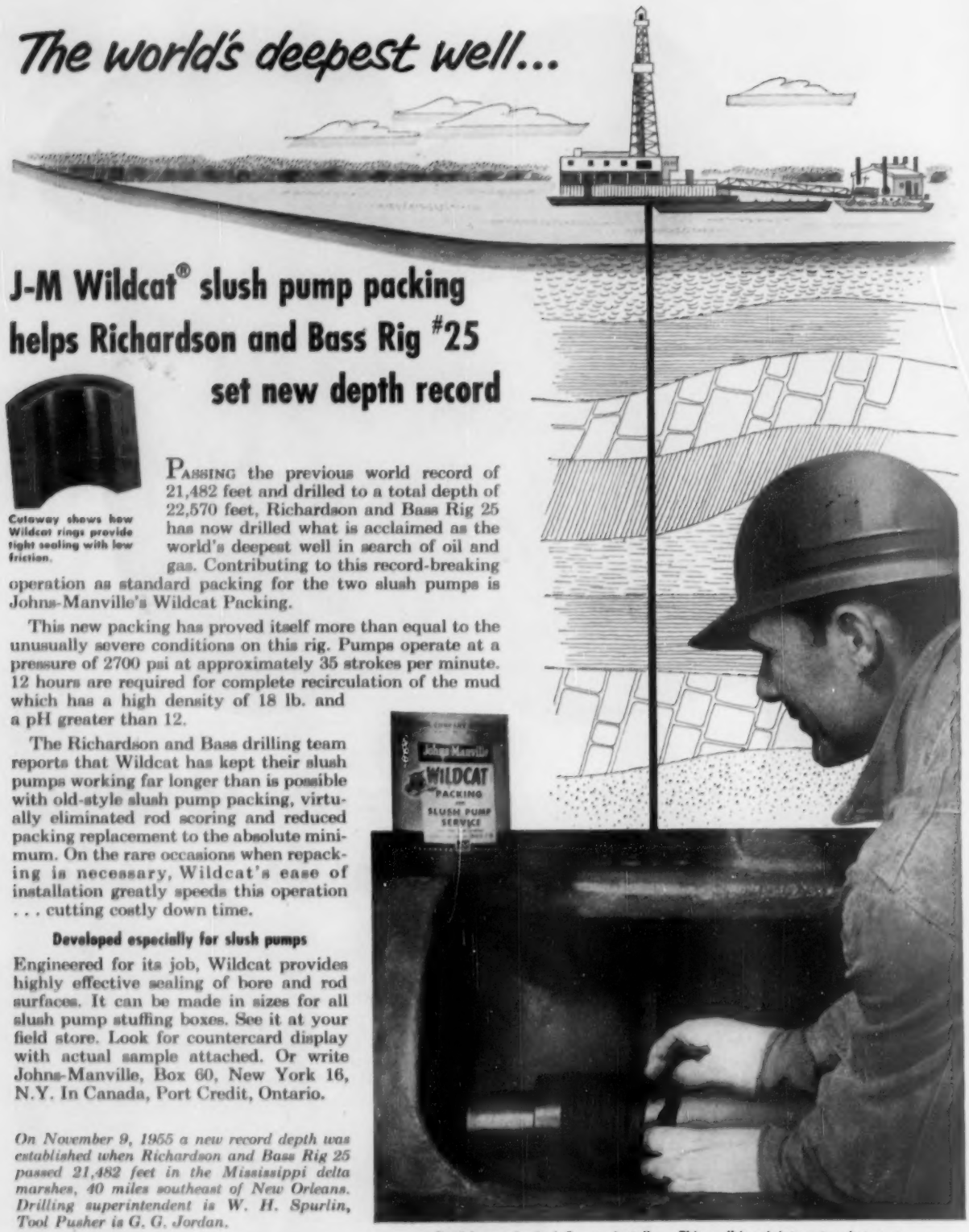
The world's deepest well...



J-M Wildcat® slush pump packing helps Richardson and Bass Rig #25 set new depth record

Cutaway shows how Wildcat rings provide tight sealing with low friction.

PASSING the previous world record of 21,482 feet and drilled to a total depth of 22,570 feet, Richardson and Bass Rig 25 has now drilled what is acclaimed as the world's deepest well in search of oil and gas. Contributing to this record-breaking operation as standard packing for the two slush pumps is Johns-Manville's Wildcat Packing.

This new packing has proved itself more than equal to the unusually severe conditions on this rig. Pumps operate at a pressure of 2700 psi at approximately 35 strokes per minute. 12 hours are required for complete recirculation of the mud which has a high density of 18 lb. and a pH greater than 12.

The Richardson and Bass drilling team reports that Wildcat has kept their slush pumps working far longer than is possible with old-style slush pump packing, virtually eliminated rod scoring and reduced packing replacement to the absolute minimum. On the rare occasions when repacking is necessary, Wildcat's ease of installation greatly speeds this operation . . . cutting costly down time.

Developed especially for slush pumps

Engineered for its job, Wildcat provides highly effective sealing of bore and rod surfaces. It can be made in sizes for all slush pump stuffing boxes. See it at your field store. Look for countercard display with actual sample attached. Or write Johns-Manville, Box 60, New York 16, N.Y. In Canada, Port Credit, Ontario.

On November 9, 1955 a new record depth was established when Richardson and Bass Rig 25 passed 21,482 feet in the Mississippi delta marshes, 40 miles southeast of New Orleans. Drilling superintendent is W. H. Spurlin, Tool Pusher is G. G. Jordan.

Derrick man Lanis J. Breaux installs Wildcat Packing on the Ideal (National Supply Company) S-935 pump.

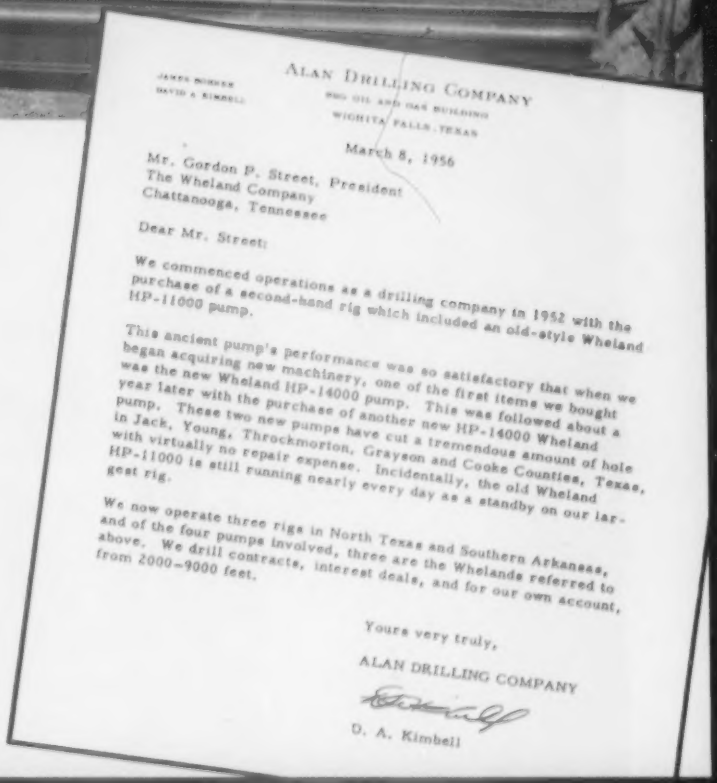
This well is a joint venture between Richardson & Bass, John W. Mecom and Freeport Sulphur Company.

Johns-Manville PACKINGS & GASKETS

"Performance . . . so satisfactory . . . we bought (2) new Wheland HP-14000 pumps . . . have cut a tremendous amount of hole . . . virtually no repair."

—D. A. Kimbell

One of the field proven Wheland HP-14000 pumps operated by the Alan Drilling Co.



ALAN DRILLING COMPANY

JAMES BURDEN
DAVID A. KIMBELL

900 OIL AND GAS BUILDING
WICHITA FALLS, TEXAS

March 8, 1956

Mr. Gordon P. Street, President
The Wheland Company
Chattanooga, Tennessee

Dear Mr. Street:

We commenced operations as a drilling company in 1952 with the purchase of a second-hand rig which included an old-style Wheland HP-11000 pump.

This ancient pump's performance was so satisfactory that when we began acquiring new machinery, one of the first items we bought was the new Wheland HP-14000 pump. This was followed about a year later with the purchase of another new HP-14000 Wheland pump. These two new pumps have cut a tremendous amount of hole in Jack, Young, Throckmorton, Grayson and Cooke Counties, Texas, with virtually no repair expense. Incidentally, the old Wheland HP-11000 is still running nearly every day as a standby on our largest rig.

We now operate three rigs in North Texas and Southern Arkansas, and of the four pumps involved, three are the Whelands referred to above. We drill contracts, interest deals, and for our own account, from 2000–9000 feet.

Yours very truly,

ALAN DRILLING COMPANY

D. A. Kimbell

OUTSTANDING PERFORMANCE!
DEPENDABLE OPERATION!
LOWER MAINTENANCE!

WHELAND HP-14000

7-1/2"x14" DUPLEX SLUSH PUMP

350 Horsepower Nominal Input at 60 RPM

Discharge pressure with 7 1/2" liners 838 PSI

Discharge pressure with 5 1/2" liners 1627 PSI

Built for fast, steady operation!

Delivers more pressure per pound of pump!

write for detailed bulletin

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ROTARY DRILLING MACHINERY

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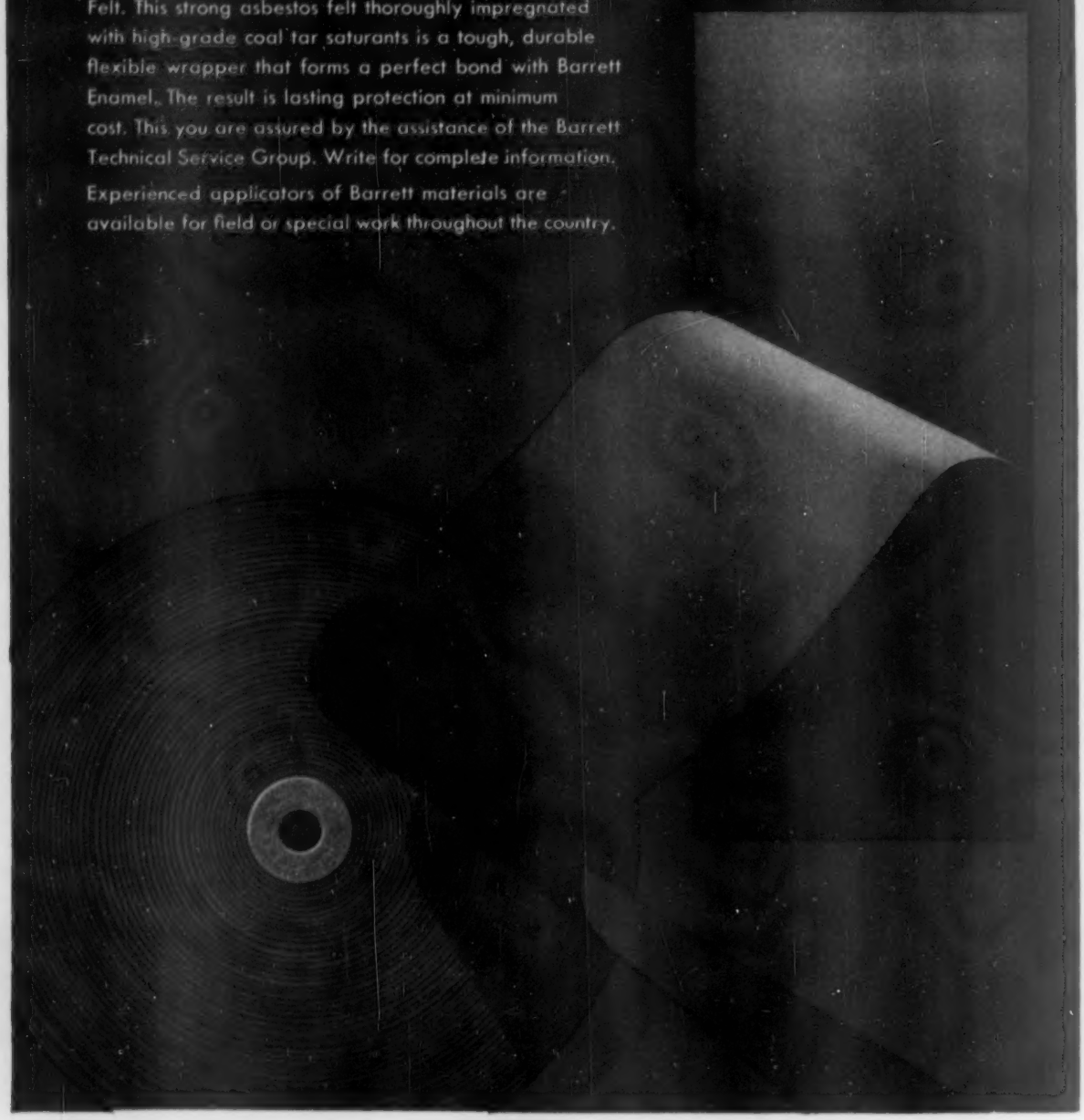
You get all-around pipe protection with Barrett Pipeline Felt. This strong asbestos felt thoroughly impregnated with high-grade coal tar saturants is a tough, durable flexible wrapper that forms a perfect bond with Barrett Enamel. The result is lasting protection at minimum cost. This you are assured by the assistance of the Barrett Technical Service Group. Write for complete information.

Experienced applicators of Barrett materials are available for field or special work throughout the country.



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BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector St., N. Y. 6, N. Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

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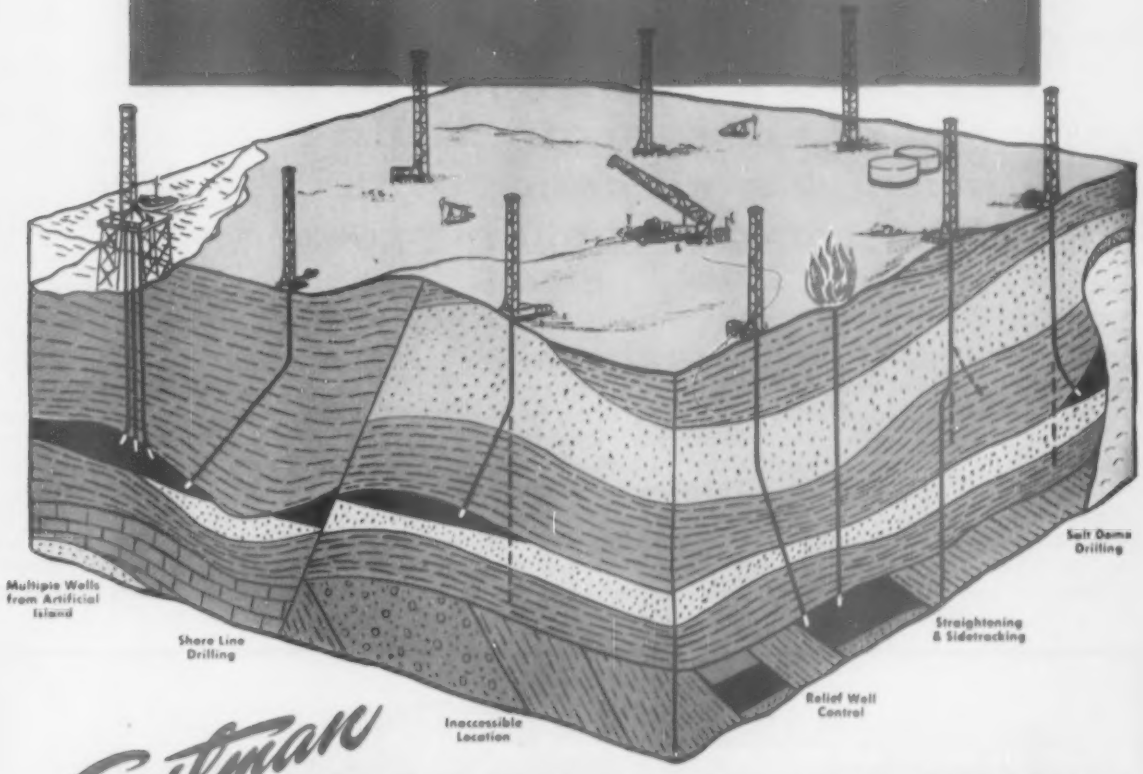
SIDETRACKING...?
OIL WELL SURVEYING...?



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THESE ARE *THE FACTS*:—

1. Over twenty-five years of continuous service provides you the best of our experience obtained from all major oil fields throughout the world.

2. We are originators of controlled directional drilling and sidetracking services.

3. We are pioneers of oil well bore hole surveying.

4. First to offer free engineering consultation service, job planning and proposals on directional drilling and sidetracking problems.

5. The only service company manufacturing its own complete line of tools and instruments for directional drilling and sub-surface surveying.

6. Constant supervision of all jobs by area superintendents.

7. The only directional drilling company with a full time research and development department devoting time exclusively to directional drilling and surveying problems, the benefits from which accrue to the oil industry in general.

DIRECTIONAL DRILLING Eastman OIL WELL SURVEYS

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EASTMAN INTERNATIONAL COMPANY

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Pound for pound, the powerful truck V8's are

They put out more horsepower per pound than any other V8 in any truck. Here's modern, *efficient* engine design with less dead weight, more pound-pulling power for you!

The new V8's in Chevrolet light-, medium- and heavy-duty trucks are the *most modern* on the market—and the pounds prove it! These great engines weigh up to 200 pounds less than competitive V8's, yet are fully comparable in power output. The *dead weight* you'll find in other V8's has been eliminated—to give you the leanest-muscled, best performing powerplants the trucking industry has ever known!

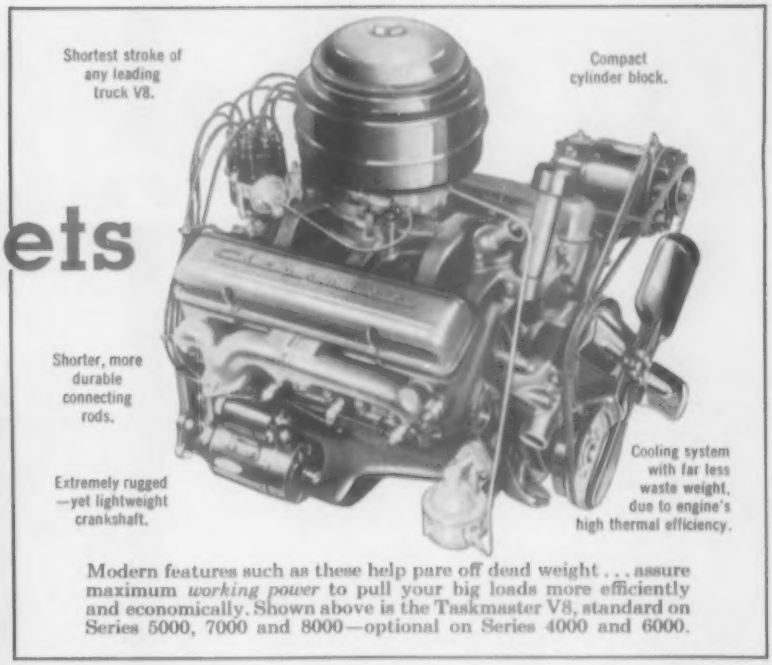
One basic reason for this compact efficiency is *short-stroke design*—the shortest stroke of all leading truck V8's. Shorter stroke means less piston travel, less engine wear, maximum pulling power from less fuel. But, when combined with Chevrolet precision engineering, it means *even more*. It makes possible, for example, a more compact cylinder block . . . shorter, more durable connecting rods . . . a crankshaft that is light yet extremely rugged. Here, every component part reflects hair-splitting efficiency that wastes nothing. *To you, it means a new kind of low-cost hauling, longer engine life, weight-saving power to pull beefed-up loads!*

NEW HEAVYWEIGHT CHAMPS!

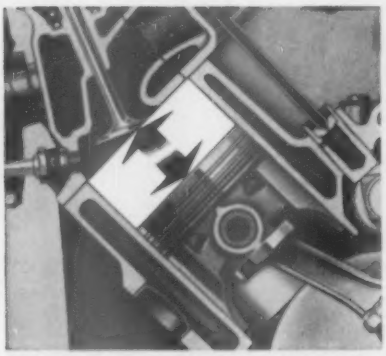
CHEVROLET **NEW CHEVROLET**

Anything less is an

most Chevrolets


Shortest stroke of any leading truck V8.
Compact cylinder block.
Shorter, more durable connecting rods.
Extremely rugged —yet lightweight crankshaft.
Cooling system with far less waste weight, due to engine's high thermal efficiency.

Modern features such as these help pare off dead weight . . . assure maximum *working power* to pull your big loads more efficiently and economically. Shown above is the Taskmaster V8, standard on Series 5000, 7000 and 8000—optional on Series 4000 and 6000.



Shorter stroke, indicated by the arrow above, is your assurance of power that eats up work while using less fuel, and minimum engine wear stemming from reduced piston travel.

All-new Loadmaster V8 powers Chevrolet heavy-duty models! Typical of these great V8's is the new 322-cubic-inch Loadmaster—standard on Series 9000 and 10000. This brawny engine provides 195 hp and 310 ft.-lbs. of torque to ease your toughest pulls. High 7.7 to 1 compression ratio aids fuel economy. Advanced features such as hydraulic valve lifters, chrome-plated top ring and full-flow oil filter add to engine life, cut maintenance expense. And, like all Chevy V8's, the Loadmaster engine is leader in its class for compact, efficient short-stroke design!

Yes, whatever size truck your job calls for, Chevrolet now has a *modern* short-stroke V8 to serve you better, save you money! See your Chevrolet dealer *soon*. . . . Chevrolet Division of General Motors, Detroit 2, Mich.

NEW MIDDLEWEIGHT CHAMPS!

TASK·FORCE TRUCKS

old-fashioned truck!

J&L Service

wraps up the world's most wanted

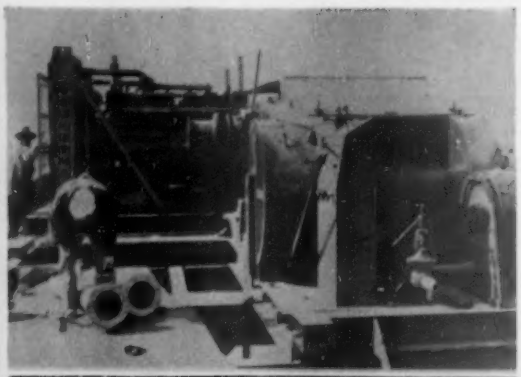
Rotary Rigs

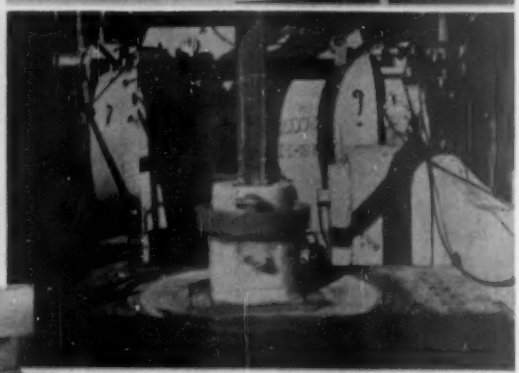
A driller's natural desire to own the last word in equipment has made Ideco the most wanted rotary rigs in the world.

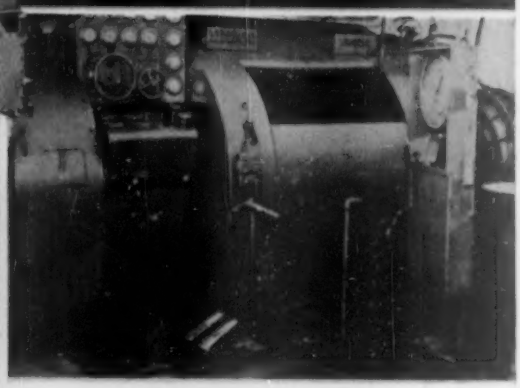
J&L parts service wraps up this situation — makes these finest of all rigs the best buy in the United States and Canada.

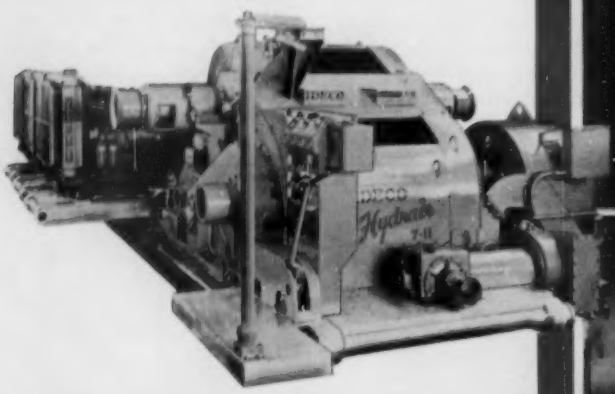
J&L has an Ideco designed and rated to do the job you have in mind and — thanks to J&L service — keep on doing it.

For detailed descriptions, specifications, performance characteristics, get your J&L store on the telephone. Ask for Catalog No. 55.









Rig capacities from 2,500' to 20,000' with 4½" drill pipe. Rigs to 6,000' capacity can be trailer mounted.

"Hydrair" hoists combine a hydraulic torque converter drive with air clutch and air controls.

Power rigs have a mechanical or fluid-coupling drive, with air clutch and air controls.

Jones & Laughlin

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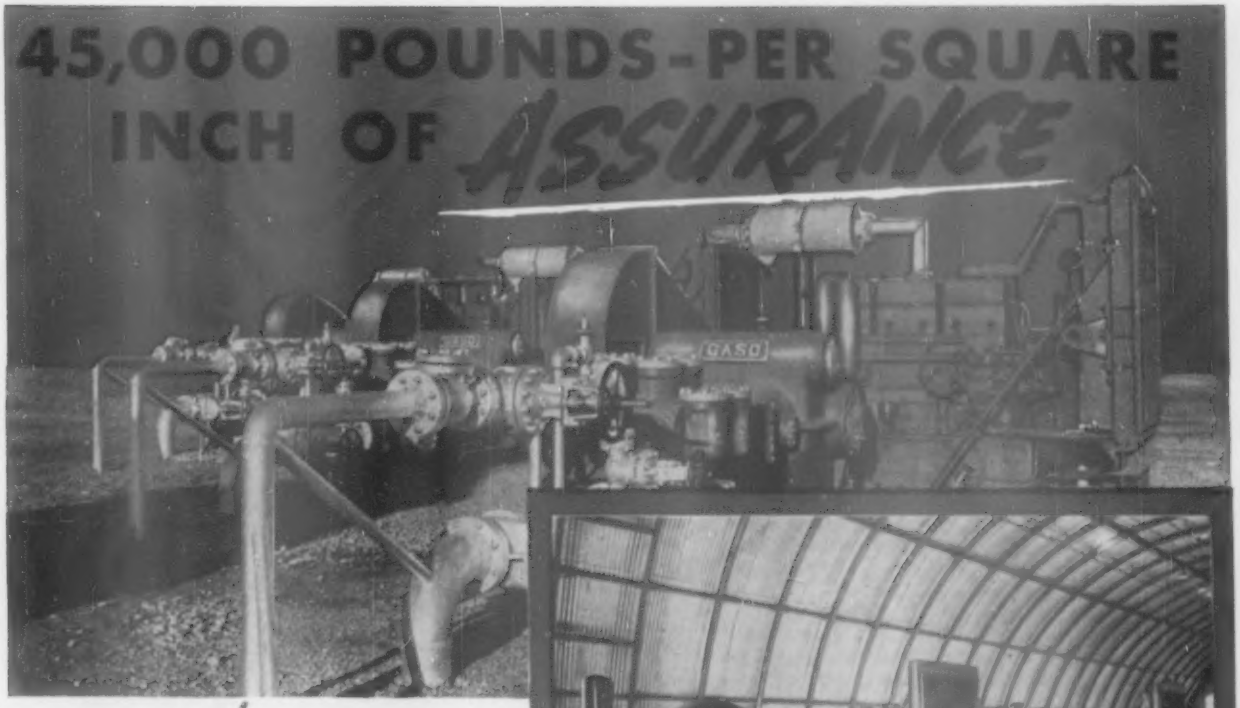
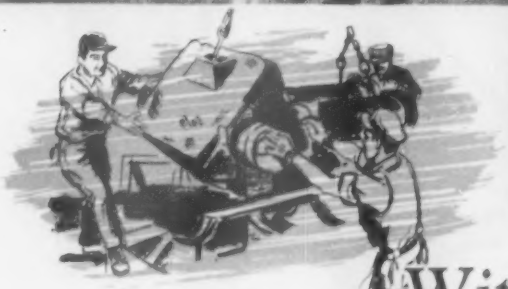
45,000 POUNDS-PER SQUARE INCH OF *ASSURANCE*





. . . With Every GASO PUMP

● The men in this picture are laying the foundation for the brand of service that has established Gaso Pumps as the favorite of oil men throughout the free world.

They are preparing the mold for the power frame of a Gaso Pump. Into it will be poured a formula of molybdenum alloy cast iron tested, refined and improved over a period of more than a third of a century. Test bars of the metal are sent regularly to a nationally known laboratory for tests. Consistently the tests show a tensile strength per square inch of 45,000 to 48,000 lbs.

It is this emphasis on strength and performance, carried through every detail of design, that gives Gaso users the assurance of extra life, extra service, extra returns on their pump investment.

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for every oil industry need

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LUFKIN MACHINE CO., Ltd., Edmonton, Alberta

Now...a New advance in...

Gauge Safety!

Another step ahead in Marsh Gauges: the new Marsh "Safecase". Down to the final detail this gauge is developed for those applications where an unexpected surge of heavy, explosive over-pressure can occur.

In the "Safecase" a solid metal barrier protects the entire face. But, still more important, the *entire back* of the gauge is a thin, ductile plate, designed to open out when subjected to abnormal pressure. Back plate is held firmly to the case by two holding screws and cannot be dislodged by a pressure blowout.

In exhaustive tests it has never been possible to shatter the crystal or create any other dangerous condition in a "Safecase" gauge with its safety-release back. The accompanying illustration shows the result of one of a series of tests in which blank cartridges were fired in the back of the case without even breaking the crystal. Think what that means in safety to operating men!

Yes, an important development . . . but merely the kind you would expect from the manufacturer who originated the "Connoweld" tube, the "Marshalloy" case, the Mastergauge movement and practically all of the major advancements in pressure gauges. Ask for up-to-the-minute information.

Pressure of explosive force merely opens out safety back

Instead of depending on blow-out plugs, entire back of Safecase Gauge is designed to yield to over-pressure. Photo at left shows actual result of firing cartridge within back of case. Safety-release back exhausted pressure. Front remained intact.

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Sales affiliate of Jas. P. Marsh Corp.
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"THE STANDARD OF ACCURACY"

MARSH GAUGES

Pumping Progress Report

FOR PETROLEUM ENGINEERS

An advertisement prepared by the Aldrich Pump Co., Member of Hydraulic Institute, U.S.A.

PUMP INSPECTION, MAINTENANCE AND REPAIR are jobs too frequently ignored in the design of production pumps. This has been verified by a survey of more than 15,000 pump installations. Speed and economy of maintenance was frequently quoted as a major factor in pump selection.

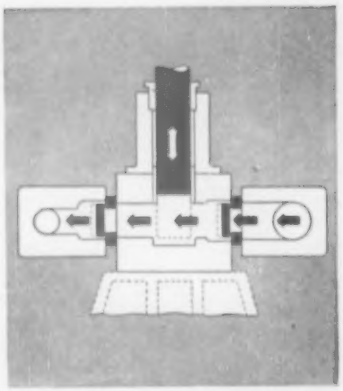
SECTIONALIZED FLUID-ENDS offer one of the best ways to guarantee both speed and economy in pump maintenance. As originated by ALDRICH Pump Co. Engineers, the Sectionalized Fluid-End comprises four main assemblies — the working barrel, suction manifold, discharge manifold and stuffing box.

SPEED IN MAINTENANCE is assured because of ease of accessibility of all wearing parts. Manifolds can be slid back on studs and valves removed as complete units. Split collar and flange connection of plunger to yoke permits easy removal of plunger.

ECONOMY OF MAINTENANCE results from speed in maintenance. Perhaps even more important is the simple fact that it is cheaper to replace a single section than a complete fluid-end. Another important economy is parts interchangeability. Among 3-, 5-, 7- and 9-plunger units of any series, wearing parts are interchangeable. Where a combination of multiplex pumps is required, this reduces spare parts stocks.

THE ALDRICH PUMP COMPANY is the originator of the DIRECT FLOW principle — a design innovation that utilizes the sectionalized fluid-end principle. Aldrich Engineers have become known as the people to take your tough pumping problems to. We have never turned down a challenge.

FURTHER INFORMATION can be had direct from the company. Tell us your problem and we'll send you Data Sheets describing the size pump we recommend to solve your problem. Address your request to: The Aldrich Pump Company, 9 Gordon Street, Allentown, Pa.



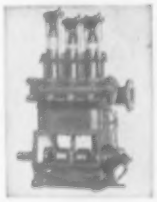
Aldrich Direct Flow Fluid-End Design

...for your tough pumping problems specify ALDRICH

The Direct Flow principle, an Aldrich design innovation, is a major forward step toward the solution of tough pumping problems of all kinds. Not only does it eliminate two right-angle turns in the fluid-end, but in addition makes possible complete Fluid-End Sectionalization. This is another Aldrich design innovation which permits economies of maintenance and repair offered by no other type pump.

CHECK THESE ADVANTAGES OF SECTIONALIZED FLUID-ENDS:

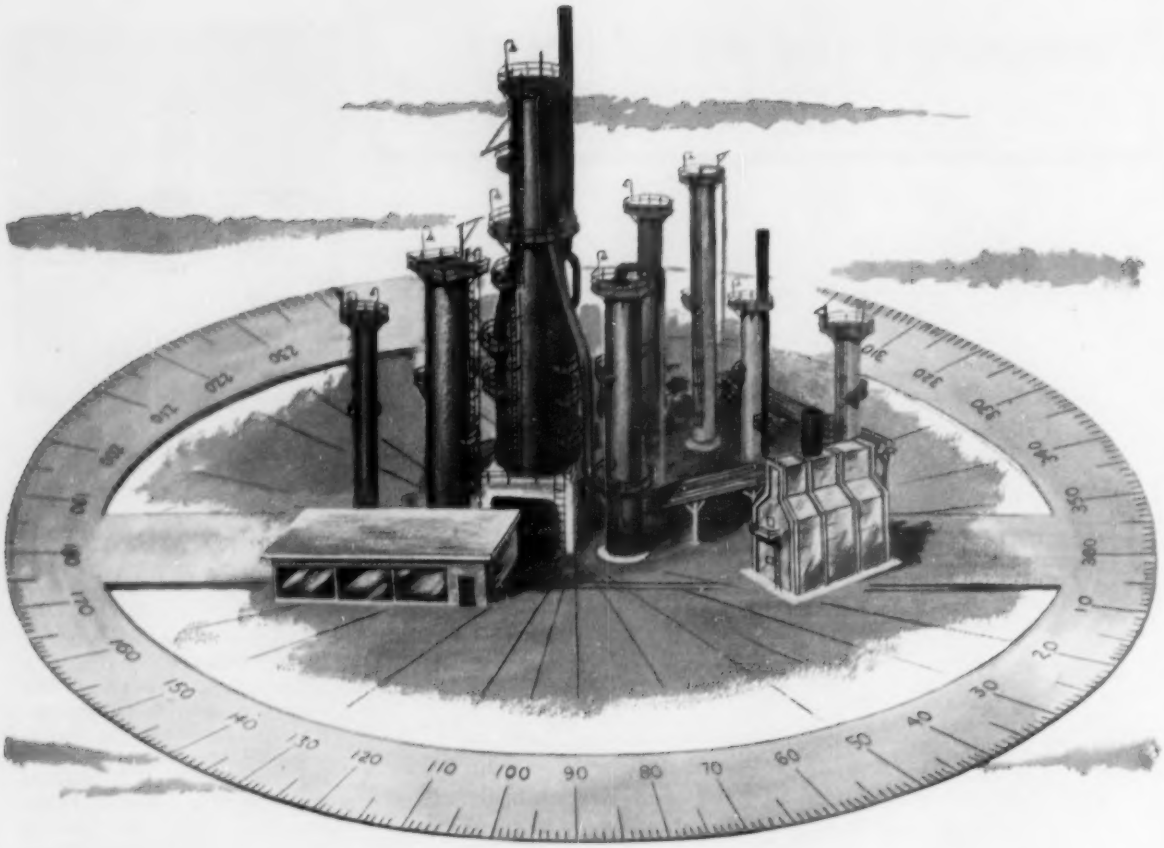
Less expensive parts replacement
Ease of inspection and maintenance
Interchangeable wearing parts
No special equipment for valve removal
Easily accessible stuffing boxes



Write today for Data Sheets describing the Direct Flow Pump Series.

THE ALDRICH PUMP COMPANY

Originators of the Direct Flow Pump
9 GORDON STREET
ALLENTOWN, PA.
Representatives in principal cities



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No matter how you look at it, PROCON'S dependable and complete process construction service includes every high standard of efficiency, economy, and quality. Oil refining, chemical, petrochemical companies look with confidence to PROCON for planning, engineering, procurement, construction, and inspection . . . all under ONE responsibility.

Organized to provide the broadest, most flexible services—including new plant construction, additional process facilities, expansion, or modernization—PROCON performs every function *on time, economically* and *to specification.*

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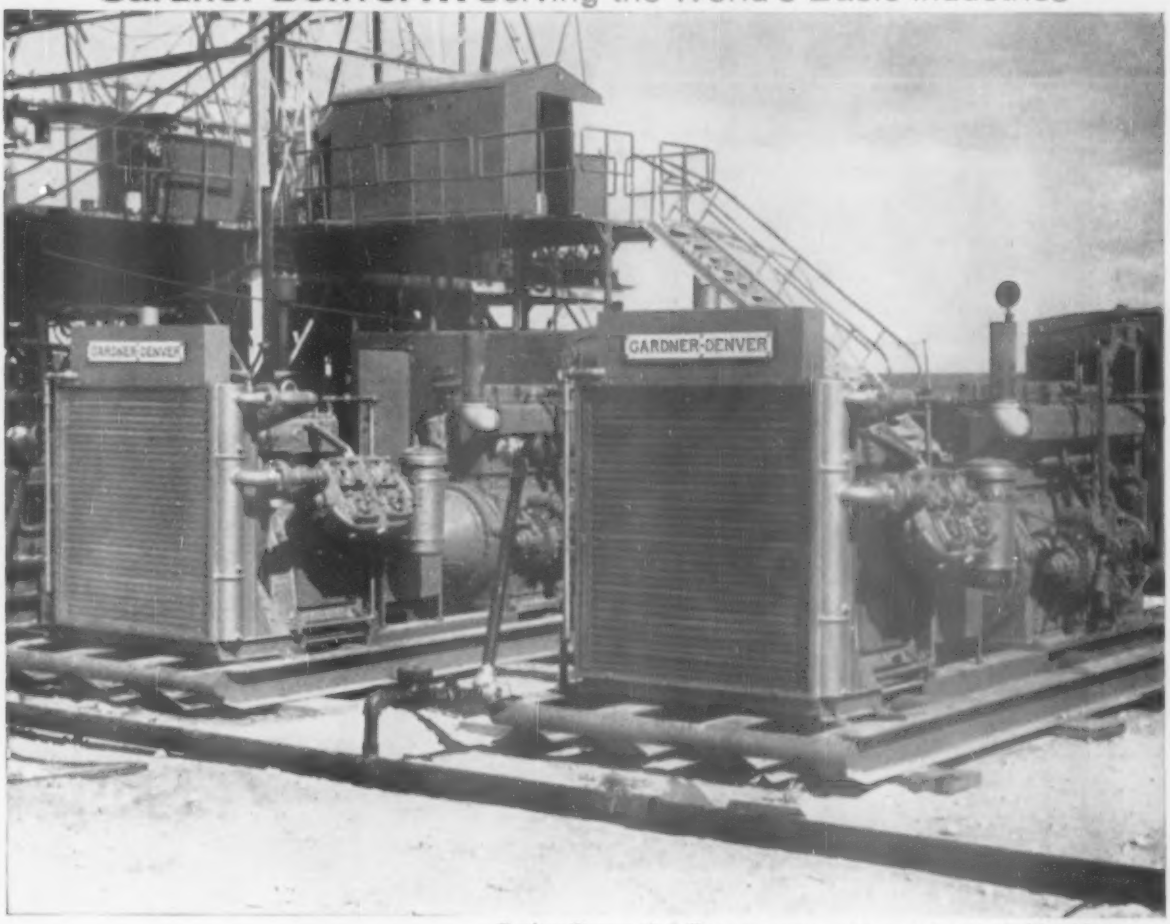

Gardner-Denver air drilling compressor units on rig location in New Mexico.

Come to Gardner-Denver first for expert engineering on air drilling

Ready to tackle rotary drilling with compressed air? Let Gardner-Denver experience engineer the compressor capacity you'll need. Gardner-Denver installations now in the field are backed by:

Three generations of service to the drilling industry.

Hundreds of booster compressor units in operation.

Manufacturing experience with many compressor types and sizes.

A specialized oil field assembly plant at Dallas.

Write now for details.

Keeping up the air pressure for effective air drilling. Close-up of pressure gauge on one of the units shown above.

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

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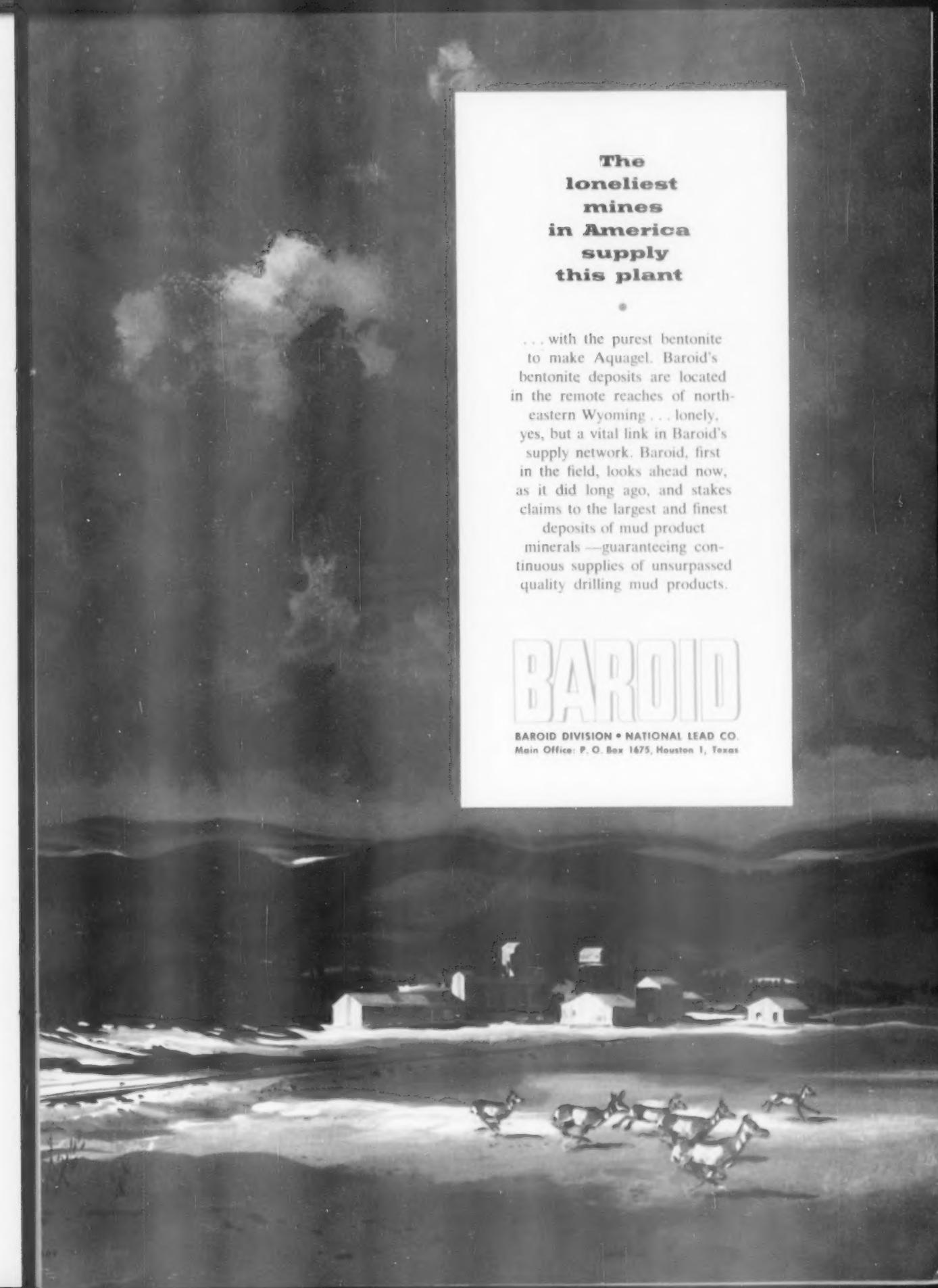

The loneliest mines in America supply this plant

. . . with the purest bentonite to make Aquagel. Baroid's bentonite deposits are located in the remote reaches of northeastern Wyoming . . . lonely, yes, but a vital link in Baroid's supply network. Baroid, first in the field, looks ahead now, as it did long ago, and stakes claims to the largest and finest deposits of mud product minerals —guaranteeing continuous supplies of unsurpassed quality drilling mud products.

BAROID

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USE * MONEY-SAVING

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* It's like drilling every fifth well with no cost for mud chemicals!

EVERYWHERE MAN-TAN is being used it is reducing drilling mud costs. It can save you 20% or more on your chemical costs – that is the same as free chemicals on every fifth well!

In field after field, drillers and mud engineers are thinning their mud with MAN-TAN instead of quebracho or other expensive thinners. MAN-TAN actually costs less per bag than other tannin-type thinners and does the same work.

Baroid was first to produce *efficient* mud products. Baroid is first to offer new products that *cut mud costs*. You are losing money if your drilling crews are not using MAN-TAN now.

MAN-TAN, like other tannates, is mixed with caustic soda to secure the alkaline-tannate compound that thins drilling mud.

Start using MAN-TAN now – wherever you would use quebracho or other tannin-type thinners. Write for technical bulletin or contact your Baroid Engineer.

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AXELSON PICTORIAL

PULSE RATE. A doctor checks heart beat by feeling a patient's pulse. Jerry Caldwell, Pumper for Tidewater Associated Oil Company at Talco, Texas, can tell how his wells are pumping simply by feeling the vibration on the polished rod. Recently, *an Axelson Volu-Max pump with a 1¼" bore x 7 ft. length was installed in this well* (L. D. Wilson #2). It pumps 441 BPD of fluid from 2,900 feet netting 30 barrels of 18 gravity oil. Former rate was 351 BPD and 16 barrels of oil. When your wet wells require greater gross production at the same cycle rate, try an Axelson Volu-Max.

BIRD WATCHER. Jerry Caldwell (see above) raises quail for a hobby. He has over 200 which bring an average price of $2 a bird. He is the empty-handed quail hunter's best friend. Jerry says his birds have one thing in common with Axelson oilwell pumping products—*they don't require much care.*

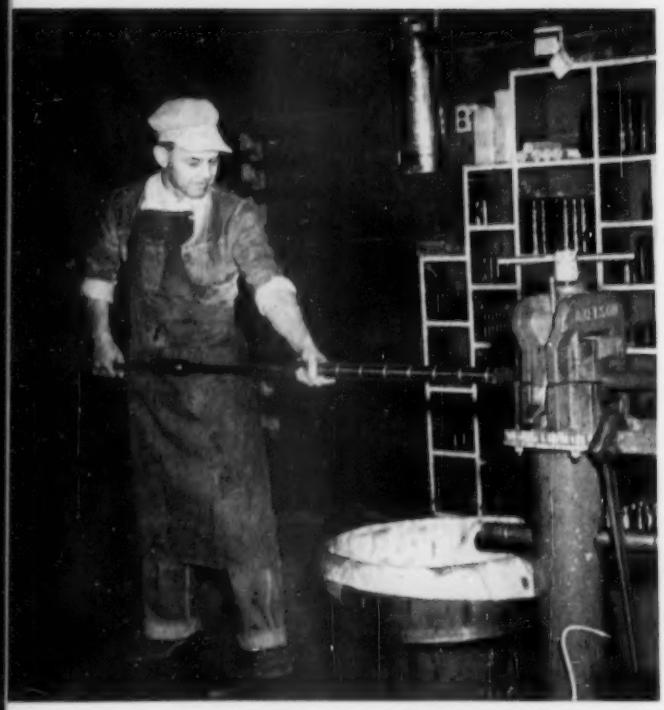
AXELSON
USI

HYDRAX. Here on a stripper well near Kilgore, Texas, is a typical Axelson Hydrax hydraulic pumping unit. Jud Hemperly, Production Foreman for F. A. Fuller Company, is well pleased with the installation – says that *Hydrax units are kind to rod strings.* An Axelson RLA Rod Liner Type Pump, 2 x 1¼ x 9 feet, produces 32 gravity oil from 3,600 feet. Together, the pump and Hydrax pumping unit make an unbeatable combination for low-cost mechanical lift.

AXELSON PICTORIAL

MATERNITY WARD. The Jones & Laughlin repair shop in Oklahoma City is a clinic for ailing pumps and a maternity ward for new ones. Watching the birth of a new Axelson deep-well plunger pump (left to right): O. W. Shepherd, J & L Store Manager; John Rogers, Repairman (see below); Charles Cawthon, Axelson factory representative; and Chet Kyle, Axelson District Manager. Pumps that have been in service for many years are brought back to their original efficiency simply by replacing worn parts, such as liners, plungers, balls and seats, cages and tubes.

ON STILTS. In Grady County, Oklahoma, this Axelson Long Stroke hydraulic pumping unit perches on a unique steel platform to keep it above the water line during flood seasons. It pumps 39 gravity oil from 9,200 feet in Magnolia Petroleum Company's Virgil Daugherty No. 1. The normal length of pumping stroke in an Axelson unit is 25 ft. Pumping rate is 4 to 6½ strokes per minute. *A conventional beam pumping unit with a 6 ft. polished rod travel would have to operate at 25 strokes per minute to match an Axelson 25 ft. polished rod travel at 6 strokes per minute.* By slowing down the pumping rate, Axelson units reduce wear and tear on subsurface pump and rods and cause less turbulence at well bottom.



EXPERT. Making up a new Axelson subsurface pump is John Rogers, Jones & Laughlin pump repairman. *John is reputedly one of the top pump men in the industry.* He was born in Wilburton, Oklahoma, is a graduate of Okmulgee Business College and is a CPA. John also plays a creditable french harp and guitar. He has been with J & L for 12 years, taking excellent care of Axelson pump customers.

MEN OF PRODUCTION. Meet Atlantic Refining Company's well-pulling crew with an excellent safety record and a soft spot in their hearts for Axelson production equipment. (Top) O. A. "Doc" Lambert, Head Well Puller; (Bottom, left to right) B. M. Battles, Gene Larrimore, Hilton Murray. They keep wells producing with Axelson pumps in the Kilgore, Texas, fields.

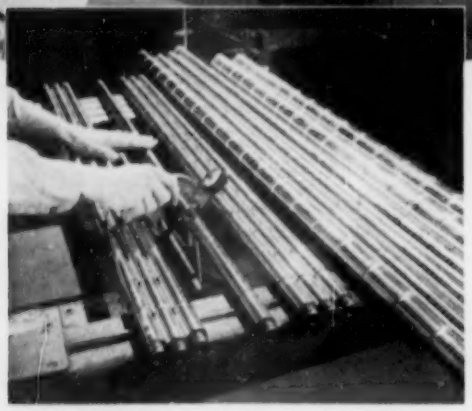
CAMERA! ACTION! This is Atlantic Refining's well gang in action (see above) stripping the Calvin Young A No. 5 in Rusk County, Texas, to locate a tubing leak. *An Axelson tubing liner pump has been producing this well for many months and went back down the well without requiring service when remedial work was finished.* This area (Longview-Kilgore) is serviced by Dick Baucum and Bill Norman, Axelson Representatives working out of Longview, Texas, and by the Jones & Laughlin supply store in Kilgore.

GOOD WORD. Dusty Dillon (left), District Production Foreman for Atlantic Refining Company in East Texas, looks over well-pulling operation (above) while Doc Lambert lifts another stand of pipe. Like many another production head, Dusty has a good word for Axelson plunger pumps and sucker rods.

AXELSON
USS

AXELSON PICTORIAL

HOT ROD. Slippage in subsurface pumps is frequently caused by wear on the outside surfaces of plungers. To give Axelson plungers long-wearing quality, surfaces are flame-hardened. Mike Sanceri, Axelson Rockwell operator, makes a hardness test on an Axelson plunger to make certain that heat treatment is uniform and to specifications. In spare time, Mike builds hot rods. His latest (a Model A frame and body with a '52 full-race Lincoln engine) took a fourth in its class at Bonnieville doing 164 MPH.



MIKE SIDE. Axelson plungers are made to fit as snugly in pump liners as pistons in a compressor cylinder. *Fits are within .001 inch.* Special API gauges (manufactured by Axelson) are used to check these close tolerances. Axelson also makes chromium plated plungers in a choice of three thicknesses of chromium. (.012, .021, .030 on diameter) for greater resistance to wear. Whatever the well condition—abrasion, corrosion, high water cut, etc. — Axelson plungers withstand the gaff.

NEWEST. Jones & Laughlin employees gather around the new J & L service truck in front of the Lindsay, Oklahoma store, *the newest addition to J & L's network of 91 supply stores in the United States and Canada.* (l. to r.) J. K. Guinn, salesman; L. R. Roberts, district sales manager; B. L. Parker, pump repairman; Bill Woodward, salesman; Karl Modenbach, store man; Dick Bayless, salesman; R. L. Parks, store man; D. H. Saltzman, store manager. Jones & Laughlin is distributor for Axelson production equipment.

No. 3

SEND US YOUR PHOTOGRAPHS

Keep sending us those photographs of your interesting situations and installations. We'll use them in future issues of the Pictorial. Mail photographs c/o Axelson Advertising Department.

AXELSON

AXELSON MANUFACTURING COMPANY

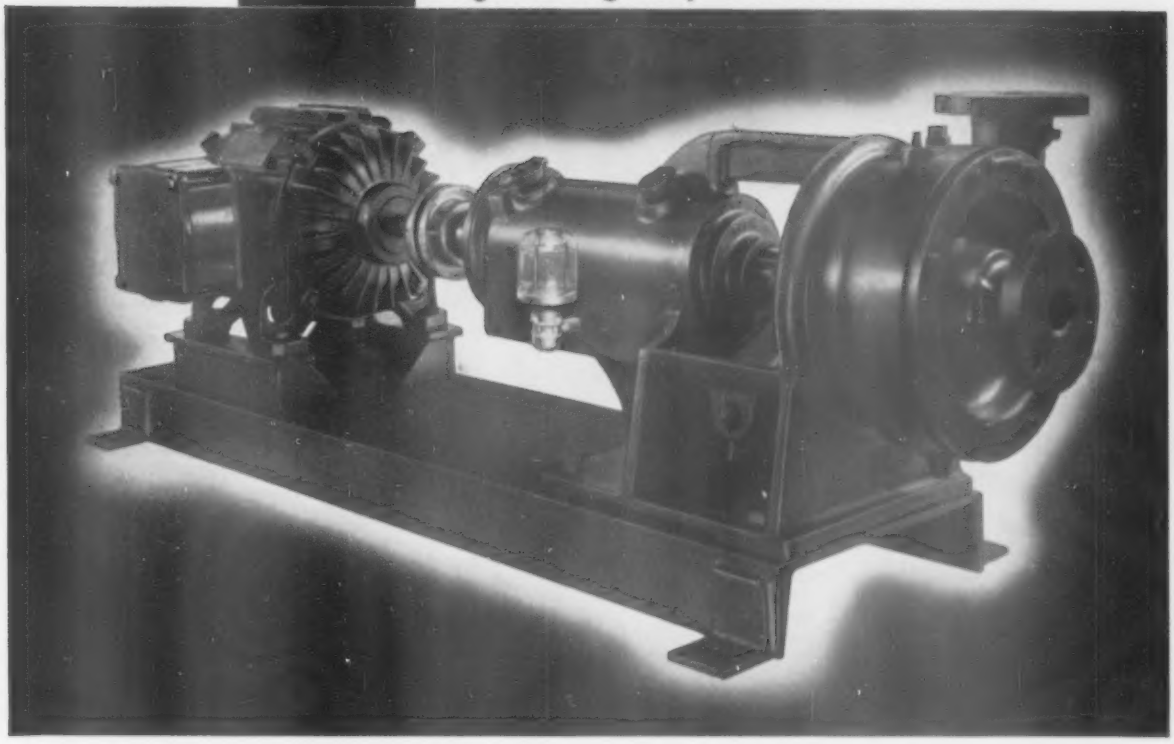
Division of U. S. Industries, Inc.

6160 South Boyle Avenue, Los Angeles 58, California

Where to buy Axelson oil well production equipment:

California: *Axelson stores at Bakersfield, Coalinga, Huntington Beach, Long Beach, Orcutt, Santa Fe Springs, Taft, Ventura; Hickey Pipe & Supply Co. (Sucker Rods)* • **MID-CONTINENT:** *Jones & Laughlin Steel Corporation, Supply Division (Headquarters, Tulsa)* • **ROCKY MOUNTAINS:** *Jones & Laughlin Steel Corporation, Supply Division; Great Northern Tool & Supply Co., Billings, Montana* • **CANADA:** Jones & McLaughlin Steel Sales Co. Ltd., *Calgary; Dominion Oilfield Supply Co. Ltd., Calgary* • **MEXICO, D. F.:** *Wells Fargo & Co. Express, S .A.* • **RIO DE JANEIRO, BRAZIL:** *MAQUIP (Commercial de Maquinas e Equipamentos) S. A.* • **LIMA, PERU:** *Gross Equipment, S. A.* • **LA PAZ, BOLIVIA:** *Del Prado & Compania, Ltd.* • **BUENOS AIRES, ARGENTINA:** *Adrian Bolland & Cia., S. R. L.* • **BARCELONA, VENEZUELA:** *Servicios Industriales, C. A.* • **MARACAIBO, VENEZUELA:** *Servicios Industriales C. A.* • **TRINIDAD, B. W. I.:** *Industrial Agencies, Ltd.*

There's **MORE** Engineering help from Allis-Chalmers



Get modifications you need

with Allis-Chalmers FRAME-MOUNTED PUMPS

EXACT MECHANICAL MODIFICATIONS . . . right combination of materials...all are designed into the Allis-Chalmers pump *you* need to get lowest cost per gallon pumped. With a wide variety of optional constructions available, A-C pump specialists can build *your* pump to do any one of many refinery jobs.

Costs Less, Too

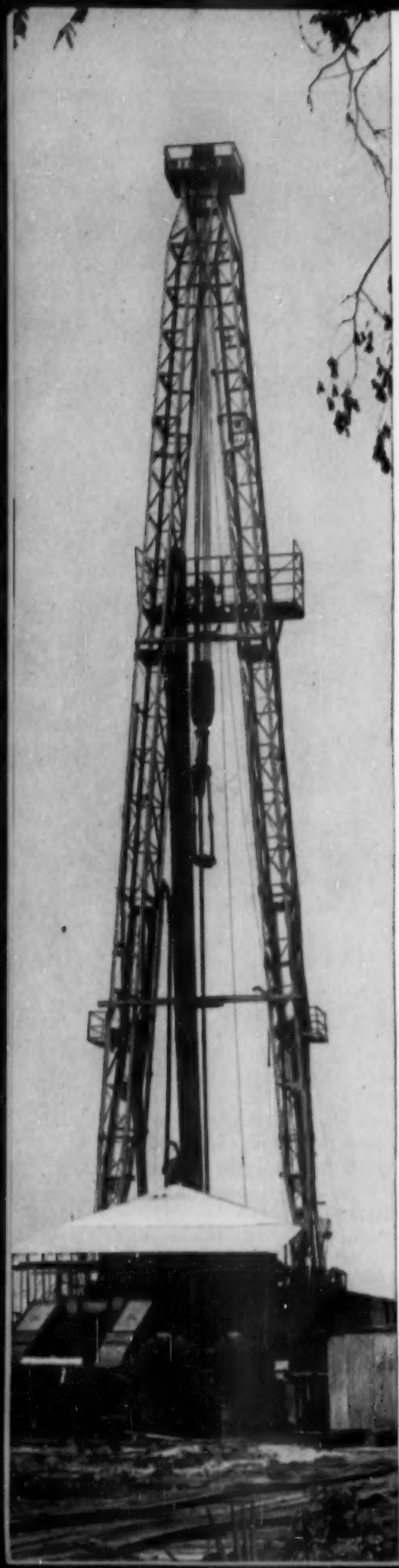
Despite custom design, the Allis-Chalmers pump costs hundreds of dollars less than costly "special" refinery pumps. Find out about its many possible applications and check these custom features:

- Available materials include iron, bronze, stainless steel, high nickel alloys and others.
- Variety of sealing arrangements are available — external seal, external grease seal, water-cooled stuffing box, single inside mechanical seal, single outside mechanical seal, double inside mechanical seal.
- Shaft is made of either high-grade carbon steel or stainless steel. Shaft sleeve is furnished in bronze or a special material — according to your requirements.

Allis-Chalmers can supply a complete pumping unit — pump, motor, drive, and control. For more information, contact your nearby A-C district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

A-4996

ALLIS-CHALMERS



Ray Fleming, distributor representative, busy handling supply requirements around the clock, cat-napped in his car when he could.

It Pays To Sleep On The Job . . .

When you're setting up one of Louisiana's largest rigs, night and day service from your independent distributor . . . keeps your ante low.

For nearly a month, Ray Fleming was on hand around the clock. During the day he was busy working with the tool pusher as new rig equipment was assembled and erected. At night he slept in his car at the rig to handle emergency requirements.

The rig went up rapidly and started drilling. Towering 147 feet above the alligator-infested marshlands of Louisiana's Grand Chenier Field in Cameron Parish, it is powered with 1,500 hp and equipped to drill to 20,000 feet. Today the rig is searching for rich reserves in one of the fastest developing oil areas in the country.

From the beginning, Ray realized he was the anchor man in a race with time to get the rig operating so it could start paying out. When an investment of nearly $1 million in equipment and other starting-up expenses is at stake, any delay is costly.

As the tool pusher points out, you can never be entirely sure you have every piece of equipment for the job until you actually begin setting up. Then you may need an item right away. So the mobile telephone in Ray's car was always ready.

At a word from the pusher, Ray was on the phone with the warehouse of the independent distributor he works for. Quickly and without red tape the order went in. Moments later a delivery truck with the item required from the warehouse was on its way over the oyster-shell roads through moss-hung oaks of Cajun

A swampland skyscraper, this 147-foot high rig is drilling for oil with Pittsburgh Steel's 5-inch OD drill pipe a few miles from the Gulf in southern Louisiana. Equipped by an independent distributor, it is the property of W. T. Burton Industries, Inc.

Getting instructions from the tool pusher on the drilling platform . . .

Without delay the needed part was delivered to the rig by the distributor's truck.

country, and up the plank road to the rig.

The rig and almost all its equipment—including the 5-inch OD Grade E Range 2 drill pipe from Pittsburgh Steel Company—was supplied through the independent. Ray followed through as friend and virtual working partner to see the venture launched successfully.

Once the rig was in operation, this extra service did not stop. Ray no longer had to sleep at the rig, but he kept in touch daily. Like all independents, the distributor Ray works for keeps 24-hour service available 7 days a week for even the smallest item of equipment.

This is one story of service. It is typical of dozens being written all the time by representatives from the 141 stores of the independent distributors (at right) who handle Pittsburgh Seamless Oil Country Goods.

Here's why drillers get a bonus from Mr. Independent Distributor: The independent concentrates his services where he can do a thorough job, rather than spreading them out thinly over big areas. He's a local man, a personal friend of the oilmen he serves. He has a working knowledge of their problems. He can anticipate their requirements.

Because his organization is small and not run by remote control, he gets answers to big problems fast and rushes deliveries with the least paper work. Yet his business is large enough to command a broad selection of the best oil field equipment available.

His overhead is low. So the extra service he can offer comes at no extra cost. He knows how to meet and beat competition, both price-wise and service-wise. His livelihood depends on it. And the return he makes stays right in the locality where he operates.

Pittsburgh Steel Company has no financial interest in any of these distributors. Yet it backs them with more than a half century of experience and know-how in production of seamless oil country goods. It gives them the kind of quality and technical assistance they depend on for reliable service to their customers.

Next time you need a string of drill pipe, casing or oil well tubing, get the pipe of your choice through the distributor of your choice! Specify Pittsburgh Seamless!

Distributor Home Offices

Bradford Supply Company
130 Main Street
Bradford, Pennsylvania

Buckeye Supply Company
18 Harrison Street
Zanesville, Ohio

C. W. Cotton Supply Company
Utica National Bank Building
Tulsa 5, Oklahoma

Franklin Supply Company
624 South Michigan Avenue
Chicago 5, Illinois

Houston Oil Field Material Co.
1524 Maury Street
Houston, Texas

Industrial Supply Company
500 Eighth Street
Wichita Falls, Texas

Iverson Supply Company
400 West Fifth Street
Tulsa, Oklahoma

Lucey Export Corporation
233 Broadway
New York 7, New York

Lucey Products Corporation
624 South Cheyenne
Tulsa 19, Oklahoma

McJunkin Corporation
P. O. Box 513
Charleston 22, West Virginia

Midland Supply Company
Box 3105
Washington St. Station
Wichita 7, Kansas

Mountain Iron & Supply Co.
100 Rule Building
Wichita 2, Kansas

Murray Brooks, Incorporated
P. O. Box 855
Lake Charles, Louisiana

Norvell Wilder Supply Company
P. O. Box 4145
Beaumont, Texas

Producers Supply & Tool Co.
706 Commercial Standard Bldg.
Fort Worth 2, Texas

Rodman Supply Company
P. O. Box 2752
Odessa, Texas

Southwest Supply Company
1720 Oliver Building
Pittsburgh, Pennsylvania

Superior Iron Works & Supply Co.
P. O. Box 1800
Shreveport, Louisiana

Western Supply Company
424 North Boulder Avenue
Tulsa 1, Oklahoma

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
Cleveland	Dayton	Los Angeles	Pittsburgh	

The IX men who supervise your seismic surveys average almost 20 years experience in the business.

Experience

Is the reason IX can produce better surveys

The personnel of Independent Exploration Company has packed more than 1,559 man years of experience into the company's quarter century of service to the oil industry. That's why Independent Exploration Company can offer you the tops in fast, accurate, informative geophysical surveys. Next time call in IX for a better job.

POINTING THE WAY IXC FOR THE DRILL

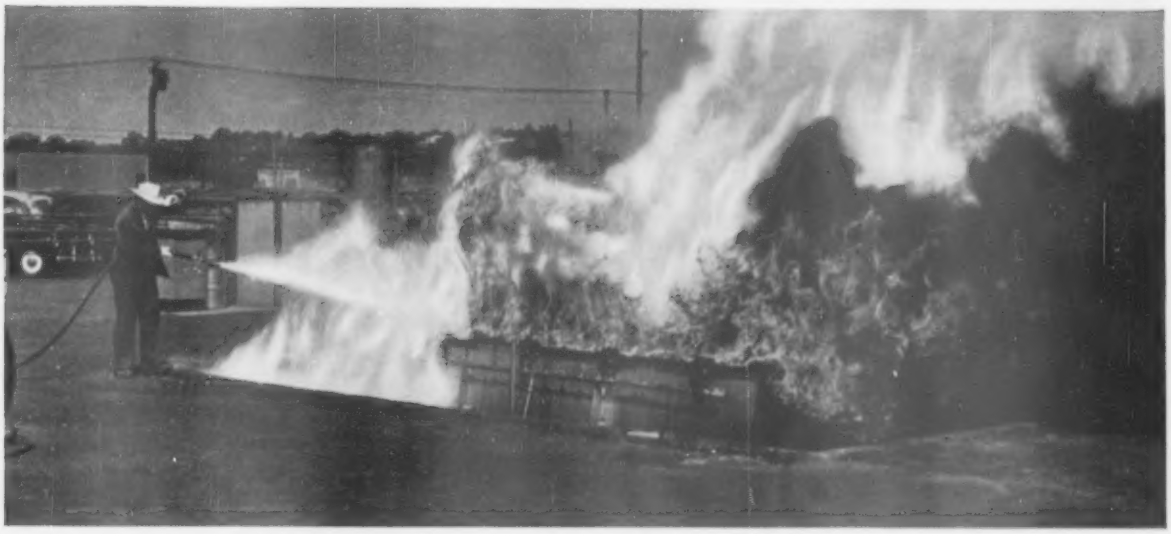
Independent Exploration Company

1973 West Gray, Houston, Texas
39 Victoria St., London, SW 1, England
208 Dominion Bank Building,
8th Ave. & 1st St. East, Calgary, Alberta, Canada

Geophysical Surveys

OVER 1,559 MAN YEARS OF EXPERIENCE

SUDDEN DEATH TO OIL FIRES!



Kidde wheeled units make short work of any blaze!

"One-man fire engines" are what some people call Kidde mobile fire extinguishing units . . . and with good reason! With one or two Kidde mobile units near large-scale fire hazards, there's no waiting fretfully for the fire department when fire strikes . . . you *are* the fire department!

Especially effective in fighting fires in oil, gasoline or other flammable liquids, Kidde *dry chemical* wheeled units have an on-off control *at the nozzle* (for easier operation) will give either "straight" or "fan" pattern for greater range or wider coverage. Designed for fast, easy maneuvering, Kidde *indoor* dry chemical "fire engines" pass readily through doorways with no costly waste motion, while *outdoor* models have wider-faced wheels for faster action on soft ground surfaces.

Kidde mobile fire extinguishing units are also available in CO_2 and foam types – illustrated and described below. For more information, call your nearest Kidde agent (he's in the yellow pages) or write today for Kidde's P-8 catalog.

40-GALLON FOAM UNITS

Ideal protection against flammable liquid fires, delivering more than ten times its tank capacity in fire-smothering foam. 50 feet of hose, 50-60 foot effective range.

CO_2 WHEELED UNITS

Available in 50, 75 and 100-pound single-cylinder capacities. Shut-off valve located at nozzle gives operator complete control. Especially good indoors since CO_2 gas leaves no mess to clean up after a fire.

150-POUND DRY CHEMICAL UNITS

Single-lever control for "on," "off," "fan" or "straight" discharge pattern. 30-40 foot range on straight discharge. 50 feet of hose. Easily handled by inexperienced operator.

Kidde Walter Kidde & Company, Inc., 554 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal—Toronto

UNIFORM DUCTILITY

. . . gives casing the properties necessary to withstand operating stresses resulting from high well pressures and long strings. Helps eliminate danger of failures.

UNIFORM WALL THICKNESS

Because Republic Casing is made from flat steel formed into a tube, both surfaces can be checked for defects before forming. Uniform wall thickness is assured at the rolling mill.

HIGH YIELD STRENGTH

. . . prevents collapse from external pressures. Republic's normalizing process produces a uniform, refined grain structure throughout the casing wall to provide uniform resistance to collapse and pull-out forces.

UNIFORMLY ACCURATE THREADS

. . . stab instantly, make up smoothly, tong up tightly. Threads are clean, full-formed, completely dependable. Uniform thickness of steel under thread roots insures maximum protection from thread failures.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

UNIFORM ROUNDNESS

Uniformly thick steel is formed into an accurate tube by seven roll stands. The tube must be concentric. Cold sizing assures accurate outside diameter.

UNIFORM PULL OUT STRENGTH

. . . is a combination of all the previous factors. To make certain you get maximum protection, every length of Republic Electric Weld Casing and Tubing is hydrostatically tested, then given final checks before being passed. The electric weld must meet the minimum tensile properties specified for the grade. That's easy because the weld is as strong as the wall itself.

STEEL

and Steel Products

. . . protection is uniform in every joint of

REPUBLIC

Normalized Electric Weld Casing and Tubing

ORDER FROM YOUR REPUBLIC OIL COUNTRY DISTRIBUTOR

Available in: Grades H-40 and J-55
Sizes 2⅜" through 13⅜" O.D.

MAIL COUPON FOR ILLUSTRATED LITERATURE

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Dept. C-1607
3112 East 45th Street
Cleveland 27, Ohio

Please send me more information on Republic Electric Weld Casing and Tubing.

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Company_____

Address_____

City_____ Zone____ State_____

AUTOCAR

The BIG Name in BIG Trucks in the Oil Industry

AUTOCAR in the picture—owned by James Orr, contractor, Casper, Wyoming. Model DC-10264, 235 inch wheelbase. Autocar Driver Cab, 11.00 by 22 tires. Oilfield body includes winch and fifth wheel for semi-trailer.

GET ACQUAINTED WITH AUTOCAR

We'll be pleased to give you all the facts about Autocar for your business—demonstrate Autocar engineering to your exact needs for extra earning power. Call on your Autocar-White Representative or send coupon.

AUTOCAR DIVISION
The White Motor Company
Exton, Pa.

Send me facts about the Autocar All-American Line for my business.

Name_____

Firm_____

Address_____

Interested in Gasoline Models_____ Diesel_____

19-E

AUTOCAR is bigger and huskier than ever—engineered for the really big payloads.

That's why you hear so much about Autocar for the extra heavy hauling jobs in the oil industry—in every business!

The exclusive construction features—like bolted construction, renewable bushings, the famous Autocar driver cab and many more—make the new Autocar All-American Line the right choice for your big jobs, your big payloads.

Solve your big hauling problems now and for years to come. Call on Autocar!

AUTOCAR TRUCKS

DIVISION OF THE WHITE MOTOR COMPANY
Factory: Exton, Pa.
Export Division • Cleveland 1, Ohio, U. S. A. • Cables: Whitco

We "Split Hairs" (and then some) to guard the quality of your Sheffield Bolts

SHEFFIELD
ARMCO

Bolt Products

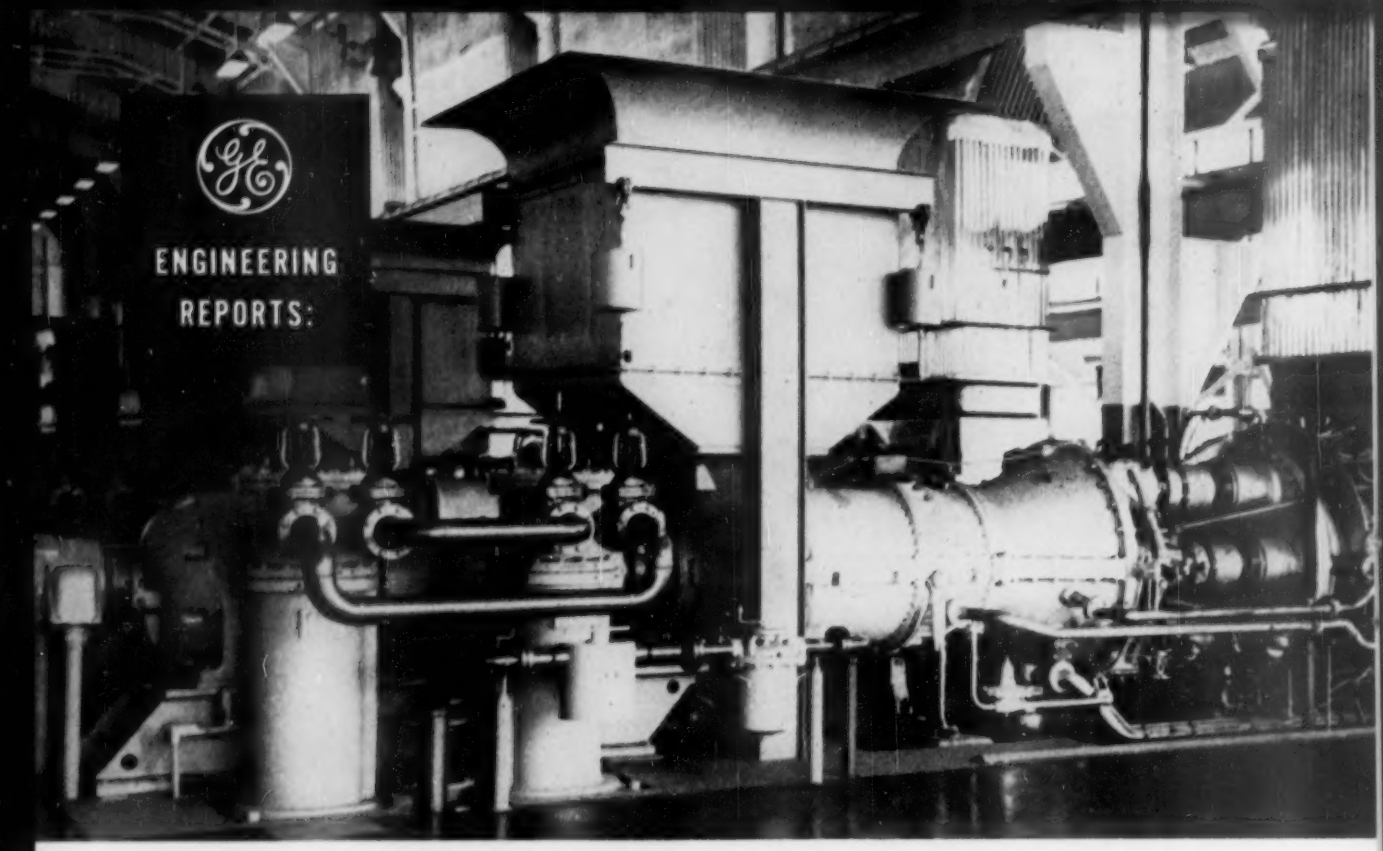
Sheffield's "serv-a-bolt" package with handy dispenser end keeps your bolts in order with filing-cabinet efficiency. Makes for easier handling all around — in the workshop, in the supply room, on the truck, on the job!

The diameter of a human hair is 27/10,000ths of an inch. The super micrometer used to check tools and gauges used in Sheffield bolt manufacture measures accuracy to 1/10,000th of an inch.

That's just one phase of Sheffield quality control. Just one reason why Sheffield bolts give you delicate precision with brute strength. Through every step of Sheffield steelmaking and bolt manufacture, we guard quality constantly with critical electronic, mechanical and chemical controls and tests. Result: bolts that install easier; hold stronger, longer.

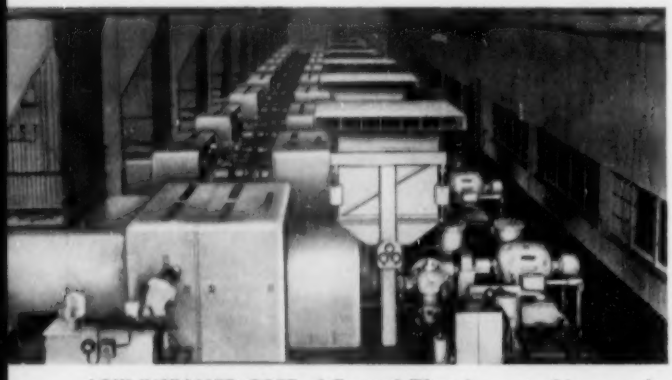
Whether you're using bolts on "do-it-yourself" projects, or drilling rig or building construction, you'll get the finest in fastening with Sheffield bolts. Be sure with Sheffield.

SHEFFIELD STEEL
DIVISION
ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA



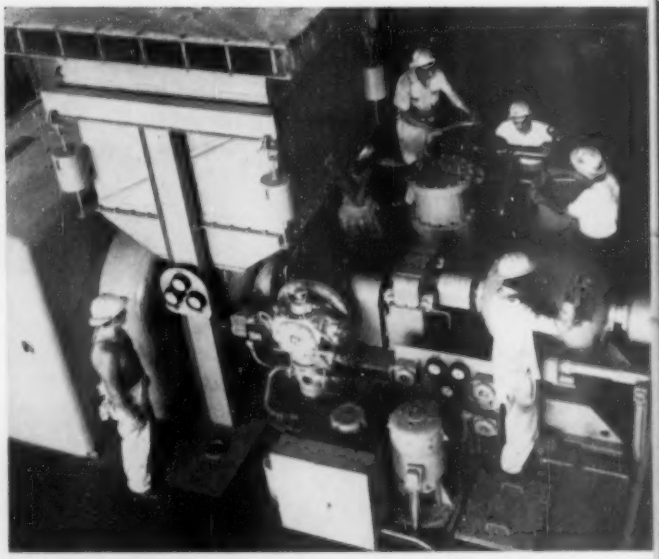
In first 13 months of operation at Lake Maracaibo . . .

Creole Petroleum's log 89,000 hours

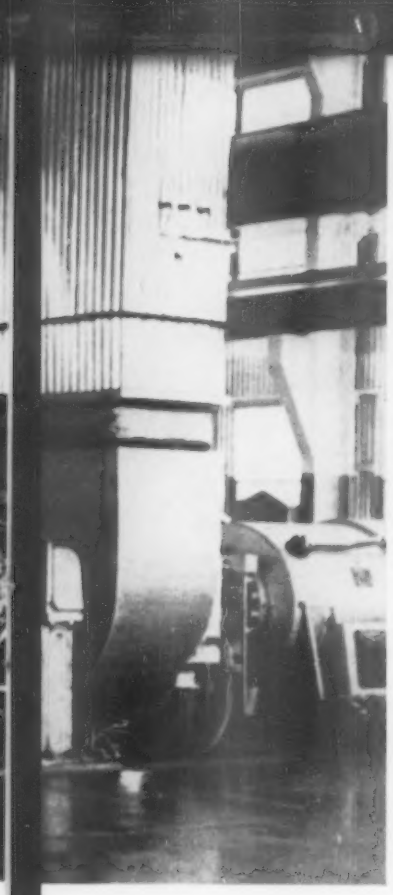


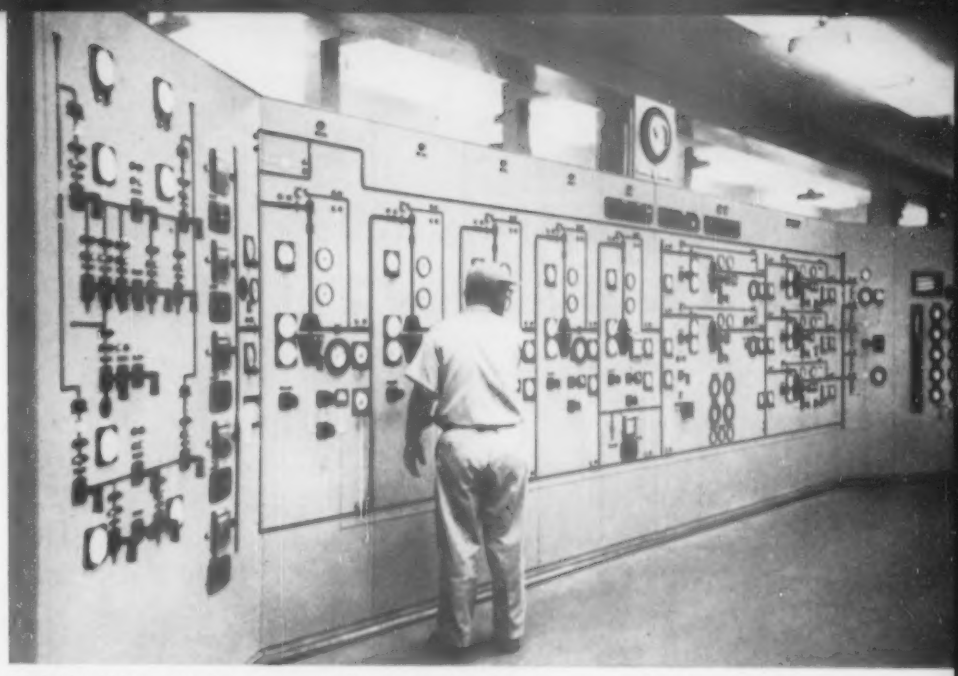
LOW INSTALLED COST of General Electric gas turbines results from ease of handling during installation. Gas turbine units up to 13,000 hp are self-contained, mounted on foundation bases which double as shipping skids.

LIGHT WEIGHT AND LOW VIBRATION are essential to Creole installation, which is mounted on piers above 60 feet of water. General Electric gas turbines fill these requirements because components are compact with minimum vibration.



SYSTEM-ENGINEERED G-E gas turbines—shown here during installation—include fully integrated starter motors and assemblies. All ten turbine-compressor units in the Lake Maracaibo plant can be started and put on the line in about ½ hour.





CENTRALIZED CONTROL of practically all station functions is combined in main General Electric control panel. Turbines, compressors and valves are directed from this board.

SEMI-AUTOMATIC OPERATION of G-E gas turbines means a minimum of operating and supervisory expense. Need for separately mounted auxiliary pumps and blowers is eliminated because of completeness of units.

10 General Electric Gas Turbines —with an availability of 98%

Creole Petroleum operates their Tia Juana No. 1 Conservation Plant on a platform over Lake Maracaibo in Venezuela—in the midst of its offshore oil fields. Ten General Electric 6000-hp combustion gas turbines —heart of the plant—power centrifugal reinjection compressors to conserve the gas and to increase the yield from these gigantic fields. This installation represents the largest concentration of gas-turbine horsepower in the world.

IN THEIR FIRST 13 MONTHS of operation, ten G-E units operated a total of more than 89,000 hours. Except for planned maintenance, the platform has never had to be shut down due to a gas-turbine outage, and availability has averaged 98% for the ten General Electric gas turbines. When sufficient gas has been available, the plant has *consistently* re-injected more than its planned capacity of 137 million standard cubic feet per day. During one week, the platform averaged 170.8 million cubic feet per day.

THE SUCCESS of this unique installation resulted from the close co-operation between Creole, their consultants—Esso Research and Engineering for process engineering and Brown and Root, Inc., for construction engineering—and G-E engineers. Creole's installation is an outstanding example of Petroleum Industry enterprise and represents a new concept in oil field pressure maintenance.

Creole is also a good example of how G-E engineering services can help you and your consulting engineer plan and install an engineered electrical system for your specific need. For more information about General Electric engineering services and electrical equipment, contact your nearest G-E Apparatus Sales representative and write for Bulletin GEA-5962 to General Electric Co., Section 661-53, Schenectady 5, N. Y.

Engineered Electrical Systems for the Oil and Gas Industries

GENERAL ELECTRIC

BUTLER buildings GO EVERYWHERE, DO EVERYTHING

for the oil industry

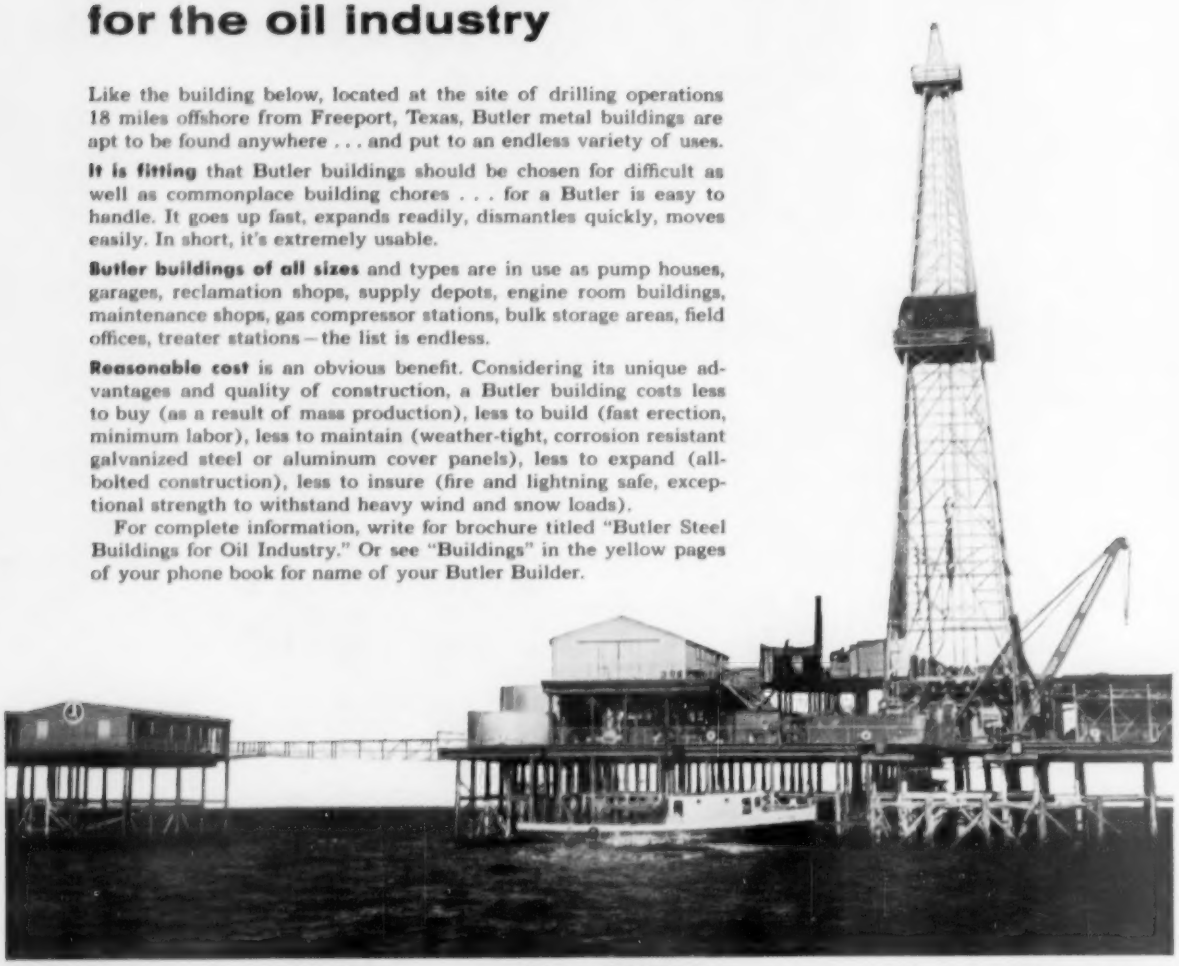
Like the building below, located at the site of drilling operations 18 miles offshore from Freeport, Texas, Butler metal buildings are apt to be found anywhere . . . and put to an endless variety of uses.

It is fitting that Butler buildings should be chosen for difficult as well as commonplace building chores . . . for a Butler is easy to handle. It goes up fast, expands readily, dismantles quickly, moves easily. In short, it's extremely usable.

Butler buildings of all sizes and types are in use as pump houses, garages, reclamation shops, supply depots, engine room buildings, maintenance shops, gas compressor stations, bulk storage areas, field offices, treater stations—the list is endless.

Reasonable cost is an obvious benefit. Considering its unique advantages and quality of construction, a Butler building costs less to buy (as a result of mass production), less to build (fast erection, minimum labor), less to maintain (weather-tight, corrosion resistant galvanized steel or aluminum cover panels), less to expand (all-bolted construction), less to insure (fire and lightning safe, exceptional strength to withstand heavy wind and snow loads).

For complete information, write for brochure titled "Butler Steel Buildings for Oil Industry." Or see "Buildings" in the yellow pages of your phone book for name of your Butler Builder.



Butler rigid frame reclamation shop in Tulsa, Okla.

Butler Panl-Frame treater house in Virden, Manitoba

Butler rigid frame gas compressor station in Dornsythe, Pa.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

7464 East 13th Street, Kansas City 26, Missouri

Manufacturers of Steel Buildings • Oil Equipment • Farm Equipment • Dry Cleaners Equipment • Outdoor Advertising Equipment • Special Products

Sales offices in Los Angeles, Richmond, Calif. • Houston, Texas • Birmingham, Ala. • Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. • New York, N. Y. • Burlington, Ont., Can.

Why Oilwomen Everywhere are Saying...

"Have Magic Suitcase ...Will Travel"

Every woman is interested in beauty—clothes—homemaking. But not every woman knows how big a part *oil* plays in a woman's world! That's why the Oil Industry Information Committee sponsors a Women's Program.

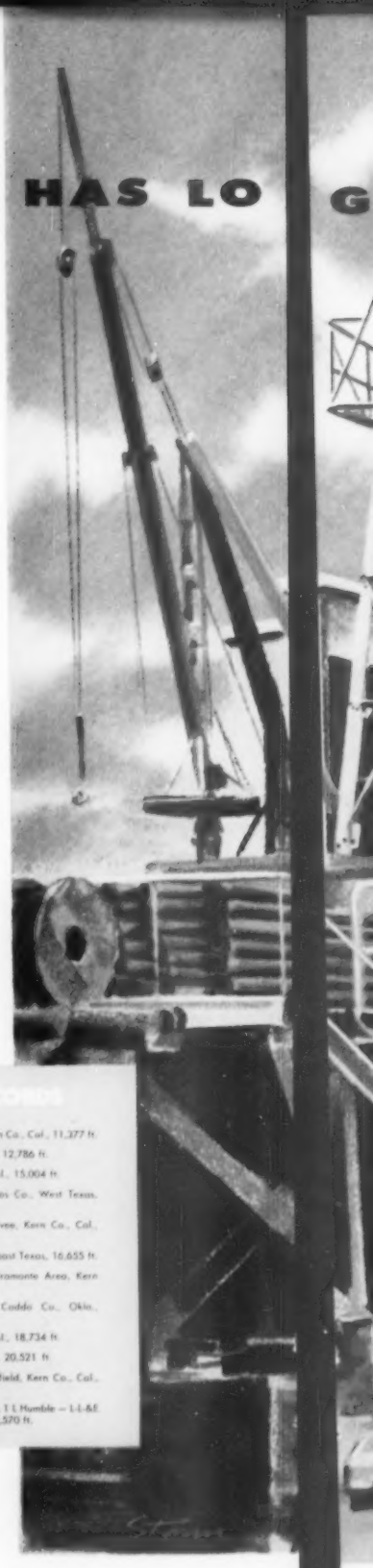
Today, hundreds of oilwomen—industry employees and oilmen's wives—help tell the story of oil in an interesting and dramatic way. The "Magic Suitcase" is one way. It contains products made from petroleum—cosmetics, detergents, oil-based "miracle" fabrics and many other items a woman uses in her daily life. This demonstration—as well as other lectures and displays—shows her how *oil* and *oil* products help make her look more beautiful and make her housework much easier.

The Women's Program is only one of many ways through which your OIIC helps show the public that it is best served by a privately-owned, fully competitive oil industry. If *you* would like to aid in the Women's Program—or another of OIIC's many activities—contact the OIIC in your area today. You'll not only be helping your industry but you'll get a wonderful sense of personal satisfaction from it as well.

For the address of your local OIIC office, write to . . .

AMERICAN PETROLEUM INSTITUTE, 50 W. 50th St., New York 20, N. Y.

SINCE 1934 SCHLUMBERGER HAS LO



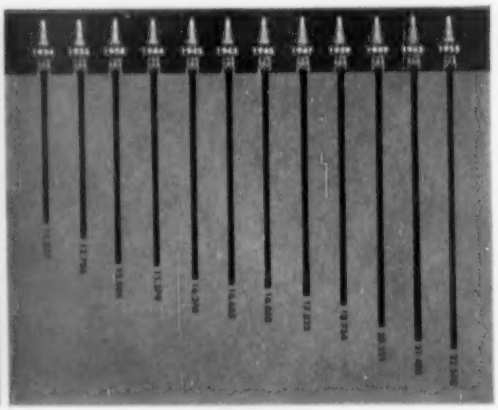
Schlumberger is proud to have been assigned the responsibility of surveying the Richardson-Bass, John Mecom, Freeport Sulphur record depth well. And with this well . . . on the edge of Lake Washington in Plaquemines Parish, Louisiana . . . Schlumberger maintained its own record of having surveyed every record depth well since 1934 when 11,137 was achieved.

Working at bottom hole temperatures of 340 degrees and with 24,000 feet of cable, the Schlumberger crew completed the record Electrical Survey without mishap or delay in only 2½ hours. Everything worked like a routine survey.

Schlumberger has been first, time after time, to encounter and solve new problems common to greater depths and unknown bottom hole conditions. The unparalleled experience which Schlumberger has gained in surveying every record well is reflected in the Schlumberger quality which you receive on every survey, regardless of depth.

How deep will drilling eventually go? No one knows. But in the future, as in the past, Schlumberger will have the equipment and techniques proved and ready to provide well services to any depth oil operators drill.

here's the box score



DRILLING DEPTH RECORDS

1934 — General Petroleum Corp.'s Berry 1, Belridge, Kern Co., Cal., 11,377 ft.

1935 — Gulf Oil's McElroy 103, Upton Co., West Texas, 12,786 ft.

1938 — Continental Oil's KCL 6-2, Wasco, Kern Co., Cal., 15,004 ft.

1944 — Phillips Petroleum's Ada Price 1, Wildcat, Pecos Co., West Texas, 15,279 ft.

1944 — Standard of Cal.'s KCL 20-13, South Coles Levee, Kern Co., Cal., 16,246 ft.

1945 — Phillips' Schoeps 3, Wildcat, Brazos Co., Gulf Coast Texas, 16,655 ft.

1946 — Pacific Western Oil's National Royalties 1, Miramonte Area, Kern Co., Cal., 16,668 ft.

1947 — Superior of Cal.'s Weller 51-11, Wildcat, Caddo Co., Okla., 17,823 ft.

1949 — Superior-Limoneria 1, Wildcat, Ventura Co., Cal., 18,734 ft.

1949 — Superior, Unit 1, Wildcat, Sublette Co., Wyo., 20,521 ft.

1953 — Ohio Oil's Kern Co. Lands "A", 72-A, Paloma field, Kern Co., Cal., 21,482 ft.

1956 — Richardson-Bass, John Mecom, Freeport Sulphur, T.I. Humble — L.L.&E. — State Lease 2414, Plaquemines Parish, La., 22,570 ft.

SCHLUMBERGER

WELL SURVEYING CORPORATION

THE EYES OF THE OIL INDUSTRY

Richardson-Bass, John Mecom, Freeport Sulphur, 1 L Humble — L-L-&E — State Lease 2414, Plaquemines Parish, La., 22,570 ft.

wherever
oil men
gather...

you hear
it more
and more...

"for my money... it's
The Fort Worth
National Bank"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

UNIVERSITY LANDS

Oil and Gas Leases

TO BE OFFERED BY

THE BOARD FOR LEASE
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THE UNIVERSITY OF TEXAS
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THIRTY-SEVENTH PUBLIC AUCTION

TUESDAY, JUNE 26, 1956

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COMMODORE PERRY HOTEL
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List of leases and additional information obtainable from:

Board for Lease of University Lands
P. O. Box 7986—University Station
Austin 12, Texas

or

University Lands—Geology
P. O. Box 1663
Midland, Texas

They Say—

Will Need Imports

"It appears probable that we shall find continuing need for moderately increasing quantities of oil from other areas over the near-term future.

"Somewhere along the line, perhaps several decades hence, if and when U. S. productive capacity ceases to expand, or actually begins to decline, we shall then need much greater quantities from other sources to meet the domestic demand.

"American companies, fortunately, I believe are now the largest owners of oil reserves abroad as they are here at home."

S. A. Swensrud, chairman of the board of Gulf Oil Corp., in address before Eastern District, A.P.I. Division of Production, Columbus, Ohio.

Low Gasoline Prices

". . . In spite of much higher costs for better quality, average gasoline prices are actually lower than they were in the last half of 1953. This cannot continue if this company and the industry are to meet the continuing growth in demand for both quantity and quality."

Robert E. Wilson, chairman of board of Standard Oil Co. (Ind.), in statement to stockholders.

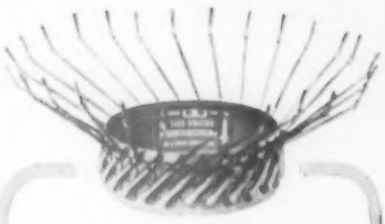
"Amen" for a New Name

Dear Sir:

Allow me to say "amen" to the Journally Speaking column in your April 23 issue on finding a family name for natural gasoline, liquefied petroleum gas, and other products of field processing plants. I have recently been assigned to a coordinating function in this area for my company, and find it hard to separate out the exact meaning of various terms used in the trade.

I would like to toss the name of "Light Ends" in the ring for consideration. Used as a general term in opposition to the term "Crude Oil," it implies the inclusion of hydrocarbons that are lighter than crude oil. If generally accepted, it could be all-inclusive for the above products including any fancy ones that became prominent in the future, like the one you mentioned, isoheptane. It is short and easy to say and write. It is already used in refining terminology to indicate the portion of lowest boiling point in any given batch of oil.

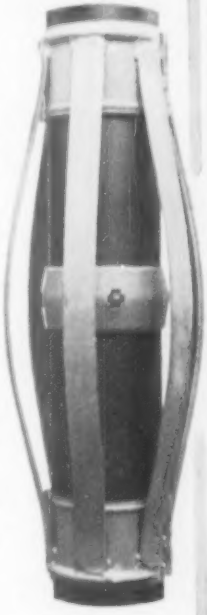
The term NGL has the advantage of



for a good cement job...

B and W

SCRATCHERS and CENTRALIZERS



Removal of mud cake and prevention of channeling are required for good primary cementing.

B and W introduced the first scratchers to the oil industry in 1939 . . . and in 1946, the first latch-on centralizer, with the Kon-Kave bow for extra centering strength.

These tools, part of B and W's complete line of primary cementing tools, help assure proper hole conditioning for a good cement job.

B and W Multi-Flex Scratcher
B and W Hinged Nu-Coil Scratcher
B and W Rotating Scratcher, Multi-Flex type
B and W Rotating Scratcher, Nu-Coil type
B and W Latch-On Centralizer with Kon-Kave Bow
B and W Latch-On Stabilizer
B and W Stabilock

B and W Inc.

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this *new* CARDWELL

* P.T.O. Driven
* Trailer Mounted
* Truck Mounted

What do YOU need in a servicing hoist . . . fast operating speeds . . . minimum weight without sacrificing strength . . . greatest versatility in mounting . . . rugged, yet precision construction?

Then, this Model K-200 Series fits your every requirement. These 7,000 to 9,000-foot single or double drum hoists are the result of 30 years' experience building servicing equipment that best meets the industry's specifications.

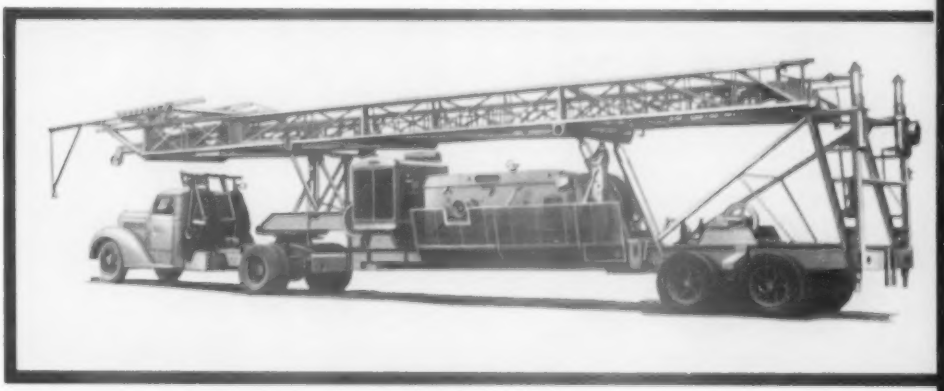
Write for complete information and prices on a hoist to fit your needs, or see your nearest Cardwell representative.

Here are the Cardwell design features that mean *Top Performance:* convenient air controls, air-friction-clutch driven throughout, including drum drives, and water-cooled braking system. Optional equipment: rotary drive assembly, and single or double leg masts or tubular steel masts.

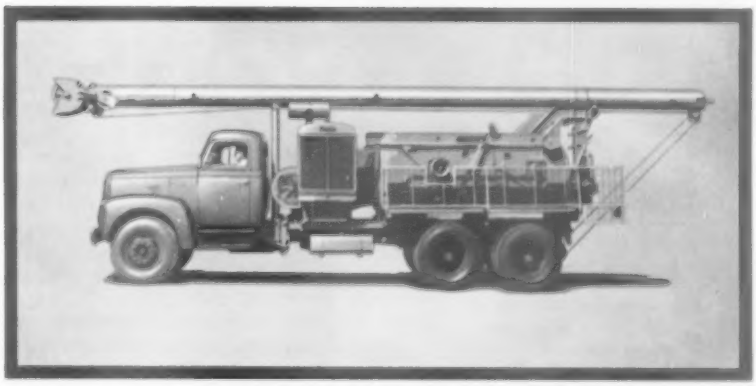
CARDWELL

Hoist will fit your every need

Power take-off K-201 holds axle loads to a minimum.



K-200 with 89-foot, 150,000 lb. capacity "Trailermast". Easy to transport and rig-up.



Truck-mounted K-200 is available with engines up to 230 H.P. to give maximum power and operating speeds.

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Edward VALVES
FOR LOW COST—High Performance

Edward GAGE and INSTRUMENT VALVES Are Inexpensive

In small piping Edward Gage and Instrument valves with forged steel bodies insure strength and compactness. Fine stem threads permit accurate regulation and keep the stem from "traveling" under pressure. Perfect alignment of the stems and seats plus centerless grinding of stems give you permanent drop-tight closure. Positive finger tight testing at rated pressures proves tightness of each Edward Gage and Instrument valve. Tapered pipe thread bonnet and "bonnetless" designs insure leakproof construction. These rugged valves cost little; reduce maintenance; give longer, more dependable service.

Always specify Edward. Only Edward Valves Equal Edward Quality and Performance.

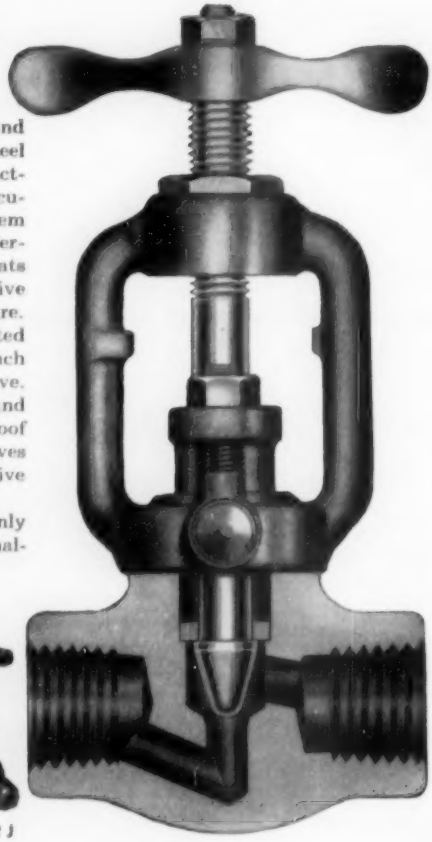

Fig. 952

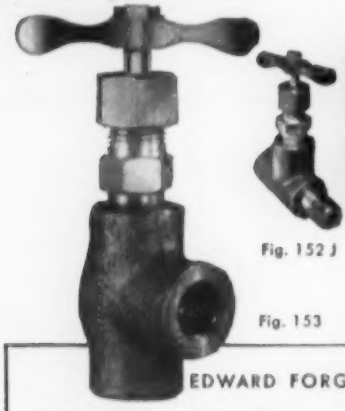

Fig. 152 J

Fig. 153

EDWARD FORGED GAGE AND INSTRUMENT VALVES

GAGE RATINGS to 4000 lb WOG—Sizes ⅛, ¼, ⅜, ½, ¾ and 1"

Fig. 152*—Globe—carbon steel—inside screw—screwed or welding ends.

Fig. 153*—Angle—carbon steel—inside screw—screwed or welding ends.

*Fig. 152J and 153J have male inlet and female outlet

INSTRUMENT RATINGS to 6000 lb WOG—Sizes ¼, ⅜, ½, ¾ and 1"

Fig. 952—Globe—carbon steel—OS&Y—bonnetless design—screwed or welding ends.

Fig. 2953—Angle—stainless steel—OS&Y—bonnetless design—screwed or welding ends.

NOTE: Forged bodies in 18-8 stainless and 13% Chromium steel also available.

For more complete details on instrument and gage valves as well as the complete line of Rockwell-Built Edward cast and forged steel valves ask for the Edward Condensed Catalog.

Edward Valves, Inc.

Subsidiary of ROCKWELL MANUFACTURING COMPANY

1212 West 145th Street, East Chicago, Indiana

being fairly well known, but on the other hand has the disadvantage of implying that all products so classified occur in natural gas. As a consequence, it would be difficult to extend the term NGL to LRG (liquefied gas derived from refinery operations) or to lighter hydrocarbons derived through chemical processing, such as isoheptane that was isomerized from normal heptane.

P. J. Colombo
4225 South Amelia Ave.,
Lyons, Ill.

New Business in Canada

"Our primary objective (in new Imperial Chemicals Products Department) will be to make available from our operations a broad line of raw materials which will be needed by chemical industries in Canada for further processing into finished materials.

"The importance of this role in the Canadian picture is evidenced when it is realized that the per-capita production of petrochemicals is still only one-quarter as high as in the United States.

"This gap, like others before, will in time be closed or greatly narrowed. In the process, we expect that our operations will provide the basis for a number of new industries."

J. R. White, president of Imperial Oil, Ltd., in statement at company's annual meeting

A Typical Business Man?

"The business man, according to . . . typical specimens, is materialistic, selfish, irritable with his employes, indifferent to his wife, contemptuous of the fine arts, and insatible in his pursuit of money.

"The fact is that any generalization about the practitioners of business or of any other profession is utter nonsense. Business, as an institution, recruits its people from the same melting pot which supplies the human raw material for any other trade or vocation. You would be as hard pressed to find a typical business man as you would a typical sports writer, professor, or musician.

"Business, unfortunately, is too often judged in black and white. Errors have been made by business men in the past . . . will certainly continue to be made in the future. Such errors must . . . be identified and corrected promptly. But emphasis on things which are wrong must not be allowed to obscure the things which are right. For it is an unassailable fact that economic progress of the monumental kind has come about through the business process.

"Much has been said in recent years of the 'new type of business man,' as if, by some process of sexless eugenics,

LUFKIN continues to maintain its leadership in the pumping unit field with the NEW C LINE OF IMPROVED CRANK BALANCED UNITS

OVER 40 SIZES RANGING FROM 4000 LB. POLISHED ROD CAPACITY AND 10,000 IN. LB. PEAK TORQUE TO 30,000 LB. POLISHED ROD CAPACITY AND 640,000 IN. LB. PEAK TORQUE

STANDARD ASSEMBLIES

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C-640DB-120-30	
C-640DB-108-30	
C-456DB-144-30	
C-456DB-120-30	
C-456DB-108-30	
* C-320D-120-25	
C-320D-84-30	
C-320D-84-27	
C-320D-74-27	C-114DA-54-16A
C-320D-74-25	C-114DA-54-15
C-228D-74-27	C-114DA-54-14
C-228D-74-23	C-114DA-54-13.5
C-228D-74-20	C-114DA-48-14
C-228D-64-23	C-114DA-42-10.5
C-228D-64-20	C-80DB-48-14
C-160D-74-20	C-80DB-42-10.5
C-160D-64-23	C-57D-48-10
C-160D-64-15	C-57D-42-10.5
C-160D-54-18	C-40D-40-7.4
C-160D-54-17	C-40D-34-8
C-114DA-64-15	C-25D-28-6
C-114DA-54-17	C-25D-24-6

These Units Are Also Available With Single Reduction Gear Reducers

The new "C" series offers a greater variety of combinations of torque, counter-balance, and polished rod capacity to suit any conceivable well condition.

LET YOUR LUFKIN REPRESENTATIVE ASSIST IN SELECTING THE PROPER AND MOST ECONOMICAL UNIT FOR YOUR REQUIREMENTS.

EXPLANATION OF UNIT DESIGNATION

* C —For Crank Counterbalance

320D—Gear Reducer (320,000 Lb. In. Peak Torque Double Reduction)

120 —Maximum Stroke (120 Inches)

25 —Peak Polished Rod Capacity (25,000 Lb.)

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LUFKIN, TEXAS

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Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, EDMONTON, ALBERTA, CANADA

Padre Island rig gets 45,214 from one Tiger Brand

Holmes Drilling Co. Rig No. 3 on Padre Island, rigged with 2500 feet of 1¼", 6 x 19, Excellay Preformed Monitor Improved Plow Steel Wire Rope with IWRC.

ton miles Wire Rope

"We always thought that 25,000 ton miles was as good service as could be expected from a drilling line, but this Tiger Brand line has lasted for 45,214 ton miles! That's the best service we ever had on any line." This statement comes from Charles N. Susil, tool pusher on Rig No. 3 of the Holmes Drilling Company, Houston, Texas.

The rig was drilling on Padre Island, about 25 miles from Corpus Christi, Texas. Four wells had been drilled with the one 2500 foot, 1¼", 6x19, IWRC wire rope. The rope had been on the rig about 15 months, making a total of 294 trips and 45,214 ton miles. That's good service any way you look at it!

The drilling on Padre Island was tough going. At times there were 290,000 pounds on the line for jarring and fishing, and much of the hole was drilled at an angle.

This job shows how accurate ton mile records give a much better picture of the real service you can expect from American Tiger Brand Wire Rope. You can get Tiger Brand Wire Rope from leading distributors anywhere in the oil fields.

One Tiger Brand Wire Rope drilled for a record-breaking 45,214 ton miles . . . almost double the expected life.

Charles N. Susil, tool pusher, says, "We got better service out of Tiger Brand than any wire rope we ever used."

Big diameter tie down and big sheaves contributed to Tiger Brand's long life.

The right Wire Rope will do the trick

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UNITED STATES STEEL

Faster metal cleaning

HIGH speed Osborn power brushes quickly and thoroughly remove even the heaviest deposits of rust, scale, dirt and incrustations from metal surfaces. They simplify the preparation of pipe ends for welding . . . speed up the finishing of welded joints.

These are but a few of the many metal cleaning problems that the oil and gas industry is solving with Osborn power brushing methods.

For information on Osborn's complete line of top-quality industrial brushes, write for Catalog 210-B. *The Osborn Manufacturing Company, Dept. N-8, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

COMPLETE TOP-QUALITY LINE
Osborn has a brush to meet every industrial need—power, paint or maintenance . . . and you get quality automatically when you specify "Osborn".

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

the bull terriers and bloodhounds of the business past had been crossbred to produce a race of intelligent and kindly poodles. I have never been able to accept this concept. It seems to me that men will always reflect the society in which they live, will respond to its pressures, its ideals, and its customs."

Crawford H. Greenewalt, president E. I. du Pont de Nemours & Co., in address before American Newspaper Association, New York.

New Frontiers of Oil

". . . Scientists are working to develop altogether new ways of exploring for oil. They are, for instance, giving much attention to the use of surface radioactivity and subsurface geochemistry. Work such as this will eventually lead to new prospecting methods and, therefore, to oil that has lain undetected by older methods."

E. F. Bullard, president of Stanolind Oil & Gas Co., in company publication, Horizons.

An Untenable Claim

"The claim which the Persian Government is repeatedly asserting to sovereignty over Bahrain has no basis in fact of history. The Sheikh freed himself from Persian rule in 1782, and placed himself under British protection in 1892. The treaty of that year gave Britain the obligation to conduct his foreign policy and the Sheikh has, since then, received and accepted British political advice. The treaty supplements similar arrangements with the Trucial Sheikhs and the rulers of Qatar and Kuwait and constitutes the foundation of Britain's predominance in the area. It was originally designed to maintain maritime peace in the area. The discovery of oil in large quantities has made it the more necessary that the treaty arrangements should continue.

"Though since 1947 agitation has developed against the ruler and his British political advisers, there is little to show that the Arab majority in Bahrain looks to Persia for political support. The Persian Government's persistence . . has been forced upon it by the antiwestern xenophobia of popular Persian opinion. It is probably also intended to forestall the extension to Bahrain of Saudi Arabia's policy of nibbling at independent states along her borders and to counter the danger to monarchist regimes from Egyptian propaganda . . .

"Britain cannot reasonably be expected to abandon her predominance in the Persian Gulf. No large state in the area concerned is yet stable enough to assure permanent access to the oil fields on reasonable terms. None of the

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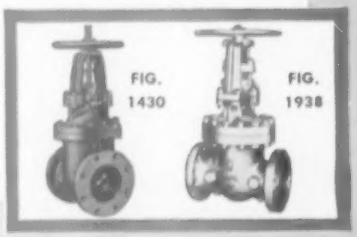
New Modern IRON and STEEL VALVE PLANT

THIS 400-foot machine bay—one wing of the new Lunkenheimer plant—houses the industry's most up-to-date precision equipment for manufacturing iron and steel valves.

Here, old-world craftsmanship and attention to detail—a Lunkenheimer tradition since 1862—are combined with modern production facilities to assure the highest standards of quality. Lunkenheimer Iron and Steel Valves are world-famous for long life and low maintenance. Their shoulderless seat rings will not warp, and the gates have exclusive machined disc guides that eliminate "chatter" and reduce wear.

This entirely new iron and steel valve plant is located next to the Lunkenheimer bronze plant, which was completely modernized a few years ago in a sweeping $3 million program. Together, they give you the finest, most dependable valves that man can build or money can buy. The Lunkenheimer Co., Box 360, Cincinnati 14, Ohio.



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MUDS THAT ARE VIRTUALLY UNAFFECTED BY ANHYDRITE AND SALT ARE MADE WITH MARATHON'S CALCIUM LIGNOSULFONATE

Marathon's calcium lignosulfonate tends to reduce viscosity and gel strength in drilling fluids.

Available under the trademark LIGNOX*, it's the only lignosulfonate proved by years of successful drilling. LIGNOX conditions lime treated muds so effectively that they are virtually unaltered by anhydrite, salt or other contaminants encountered in normal drilling, e.g.: gypsum, lime, limey shale, clays, and cement.

Whenever you prepare lime muds, insure trouble-free breakover and maintenance by using Marathon's calcium lignosulfonate.

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MARATHON *Corporation*

CHEMICAL SALES DEPARTMENT
ROTHSCHILD • WISCONSIN

smaller rulers wishes to be absorbed by his larger neighbors. So long as Britain can maintain the rulers' independence, her special position will be recognized."

Editorial in London Times.

CALENDAR OF EVENTS

MAY

16-18 American Gas Association, Chemical, Engineering, and Manufactured Gas Production Conference, Benjamin Franklin Hotel, Philadelphia.

17-18 Rocky Mountain Petroleum Sections, American Institute of Mining, Metallurgical & Petroleum Engineers, Gladstone Hotel, Casper, Wyo.

22-24 Pennsylvania Gas Association, Pocono Manor Inn, Pocono Manor, Pa.

24-25 Natural Gas and Petroleum Association of Canada, Sheraton Brock Hotel, Niagara Falls, Ont.

24-25 Western Petroleum Refiners Association, Michigan Regional Meeting, (location to be announced).

24-25 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington, Ky.

28-30 Chemical Institute of Canada, 39th annual conference and exhibition, Sheraton-Mount Royal Hotel, Montreal.

30-June 1 Texas College of Arts & Industries, eleventh annual short course in Gas Technology, Kingsville, Tex.

30-June 2 Interstate Oil Compact Commission, Dallas.

JUNE

3-8 Society of Automotive Engineers, summer meeting, Chalfonte Haddon Hotel, Altantic City, N. J.

6-8 American Society for Quality Control, tenth annual convention, Palais du Commerce, Montreal.

10-15 American Petroleum Institute, Production Division midyear standardization conference, Brown Palace and Cosmopolitan Hotels, Denver.

11-15 American Institute for the Advancement of Science, Gordon Research Conference on Catalysis and Petroleum, Colby Junior College, New London, N. H.

13 Pennsylvania Grade Crude Association, thirty-third annual meeting, Bradford, Pa.

17-22 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Atlantic City, N. J.

17-23 World Power Conference, Vienna.

21-22 Western Petroleum Refiners Association, regional technical—industrial relations meeting, Broadview Hotel, Wichita.

21-23 American Association of Petroleum Landmen, annual convention, Denver.

26-29 Canadian Gas Association, Manoir Richelieu, Murray Bay, Que.

28-30 Rocky Mountain Oil and Gas Association, board of directors, Hotel Utah, Salt Lake City.

JULY

9-11 American Gas Association, American Petroleum Institute, Canadian Petroleum Association, committees on natural gas reserves, Banff, Alta.

17-27 Program on Recent Advances in

LOW COST DIGGING

in any formation

GLOBE "SS3C"
ROCK BIT

GLOBE "S4C"
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Regular and Integral Jet Models

. . . are widely recognized for their exceptional digging ability in any formation—sand, chalk, shale, chert or lime, in ordinary formations and "streaked" formations, or Crooked hole country.

These tough, stronger, more powerful bits, bite out more hole faster all the way! First Choice of more and more tool pushers every day.

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Designed and manufactured to operate efficiently under extreme high pressures. American Iron fittings are tested to 4000 pounds hydrostatic pressure. Manufactured in a variety of versatile designs, fittings are adaptable to manifolds of any construction and are available in welded type or with standard threaded connections.

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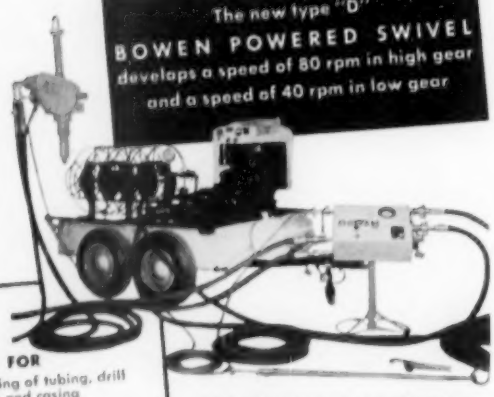
The new type "D"
BOWEN POWERED SWIVEL
develops a speed of 80 rpm in high gear and a speed of 40 rpm in low gear



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- Cutting of tubing, drill pipe and casing
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- Scraping casing
- Drilling out cement
- Milling operations
- Backing out strings of rods, tubing, etc.
- Drilling rat holes
- Drilling out inside of drill pipe after a fire or other shut down time
- Milling out undersize I.D. of drill pipe tool joints to allow passage of cutters, etc.
- Maintaining circulation and rotation to prevent sticking of pipe while repairs are being made to the drilling rig.

FOR ALL LIGHT OR MEDIUM SHORT-TIME ROTARY WORK

Bowen Powered Swivels eliminate the necessity of moving in kellys, rotary tables or other heavy equipment for light or medium short-time rotary work. They are sensitive enough for small torque operations like cutting with macaroni or sucker rods, yet sufficiently rugged to do clean-out and milling jobs.

3 TYPES OF BOWEN POWERED SWIVELS MEET EVERY NEED

The Type D is designed for medium-heavy rotary work. The Type C for medium-light rotary work and The Type B for light-duty operations.

Write for descriptive literature.

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Catalytic Polymerization, Massachusetts Institute of Technology, Cambridge, Mass.

AUGUST

2-4 Rocky Mountain Mineral Law Foundation, Second Annual Institute, University of Colorado, Boulder.

27-29 Sixteenth Annual Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPTEMBER

SEPTEMBER

9-12 Independent Natural Gas Association of America, annual membership meeting, St. Anthony Hotel, San Antonio, Tex.

11-13 Pacific Coast Gas Association, annual meeting, Coronado, Calif.

13-15 Chemical Institute of Canada, third Western Regional Conference, Edmonton, Alta.

17-21 Instrument Society of America, eleventh annual international instrument-automation conference and exhibit, New Coliseum, New York City.

20-21 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Hotel Henning, Casper, Wyo.

20-21 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual membership meeting, Roosevelt Hotel, New Orleans.

24-26 American Society of Mechanical Engineers, petroleum mechanical engineering conference, annual meeting, Statler-Hilton Hotel, Dallas.

26-28 Rocky Mountain Mineral conference, American Institute of Mining, Metallurgical & Petroleum Engineers, Newhouse Hotel, Salt Lake City.

OCTOBER

2-3 Texas Mid-Continent Oil and Gas Association, thirty-seventh annual meeting, Rice Hotel, Houston.

7-9 American Association of Oil Well Drilling Contractors, annual meeting, Texas Hotel, Fort Worth.

14-17 American Institute of Mining, Metallurgical & Petroleum Engineers, Petroleum Branch, fall meeting, Biltmore Hotel, Los Angeles.

15-17 American Gas Association, annual meeting, Atlantic City, N. J.

18-19 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

22-24 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

29-Nov. 1 Society of Exploration Geophysicists, national convention, New Orleans.

NOVEMBER

7-8 Philadelphia section, Instrument Society of America, Symposium on Process Data Logging, Stratford Hotel, Philadelphia.

8-9 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, fall meeting, Ambassador Hotel, Los Angeles.

12-15 American Petroleum Institute, annual convention, Conrad Hilton Hotel, Chicago.

19-20 American Institute of Mining, Metallurgical & Petroleum Engineers, North Texas Secondary Recovery Symposium, Municipal Auditorium, Wichita Falls.

25-30 American Society of Mechanical Engineers, Statler Hotel, New York.

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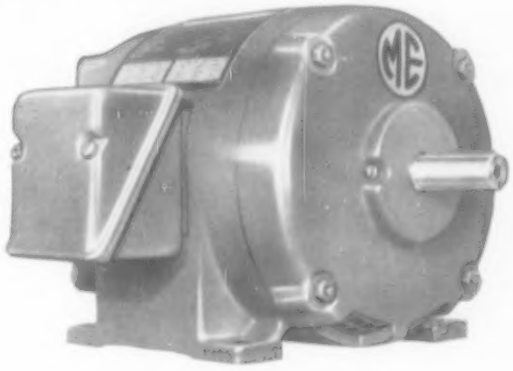

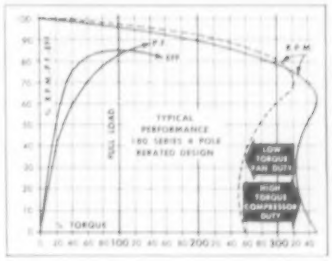

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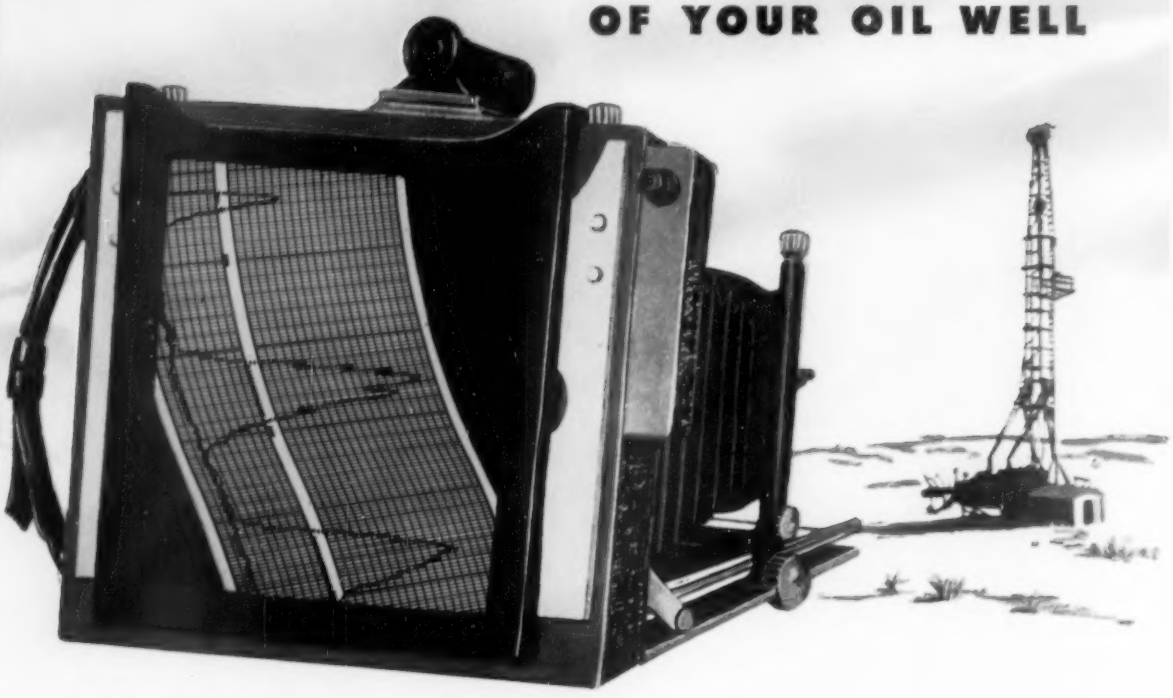

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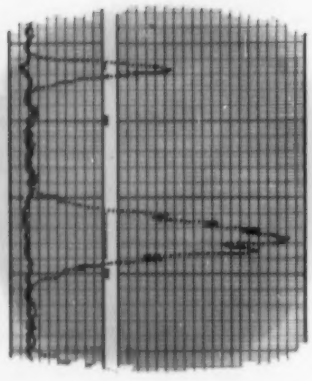

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the OIL AND GAS JOURNAL

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JOURNALLY SPEAKING . . .

Big Volume

IT'S going to be a long, long year for the Big Yellow Book. In fact, 1956 is going to go down in our history as the year with 87 weeks in it.

We are accomplishing this marvel by undertaking a calendar reform slightly less momentous than those performed in ancient times by Julius Caesar and Pope Gregory. Those reforms were made because the calendar was out of step with the sun; ours is being made because we are out of step with the calendar.

What we're talking about is our volume number. If you will look at the "backbone" of the magazine you're holding now (or at the top of Page 2) you will see that it is Vol. 54, No. 54.

Does that strike you as odd? It will if you're a librarian or otherwise have occasion to refer to publications by volume and number. You see, we are a weekly and it is theoretically impossible for a weekly to have more or fewer than 52 issues per year (except once in 7 years when it has 53).

Did we forget to change the volume number? Not at all. (We did once, several years ago, and every oil-company librarian in the world told us about it). We deliberately decided to let Vol. 54 run all through the year 1956. Come the first Monday in January 1957 and we will blossom out as Vol. 55, No. 1. Thereafter, as long as there is an oil industry, the Journal's volumes will jibe with the calendar; one year, one volume.

The trouble all started with our ancestors (isn't it nice we can blame our forebears for all our troubles?) Vol. 1, No. 1 of our favorite oil publication appeared in May 1902 (at Beaumont, Tex., about a year after the Spindletop discovery brought the center of gravity of the world's oil industry to the Southwest). But our noncalendar-conscious founder didn't end Vol. 1 when 1902 ended; he let it run until he had been publishing for a full 12 months.

Little did he know what headaches he was building for a future generation of librarians. For years people have been asking us, "Why don't your issue numbers jibe with the calendar?" But habit is strong, and so is reverence for the traditions of our founding fathers.

Finally we agreed that if the rest of the world wouldn't change its calendar, we might as well change ours. But then came the question how to adjust. Should we have a volume with fewer than 52 issues, or one with more than 52?

That, kind friends, was a momentous decision to make. It was kicked around for months. Last New Year's Day came and went without an answer. Then it was too late to change. But late in April our Vol. 54, No. 52 rolled off the presses. Again the soul-searching and hair-tearing. We had to decide—immediately and irrevocably — whether to start on Vol. 55 or just let Vol. 54 run. A staff meeting was called. The whole problem was laid on the table in cold, analytical form. Arguments were made pro and con. Votes were taken. Finally a coin was flipped. Vol. 54 runs on.

The die is cast now. We've crossed our Rubicon. We're reconciled to turning out 87 weekly issues in a single publication "year."

We just hope you clippers and filers and reference researchers appreciate this. We did it all for you. Around our shop we refer to things by date of issue, and hardly anybody pays any attention to volume and issue number.

Not so librarians. It has grieved them no end that our volume number didn't change when the calendar year changed. We can't do anything about the past. Once something is off the press an editor, unfortunately, can never recall an error.

But, beginning next January, an oil librarian's life will be easier. After that the Big Yellow Book's volume number will start afresh each year, and the issue numbers will correspond with the number of Mondays there have been since the first of the year.

For the benefit of posterity we hope that all librarians will clip and file this page and hand it down to their successors. Otherwise some future researcher, when dusting off the old 1956 shelf, may be thrown into a tizzy trying to figure out how the Journal managed to print 87 weekly issues in a single year.

—*Henry D. Ralph.*

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Navy hasn't learned the facts of oil

THE Navy has had its sails trimmed—temporarily at least—on its not-so-subtle scheme to sneak in new naval petroleum reserves.

The House appropriations committee has denied the Navy's request for $529,000 to wildcat on a gunnery range on San Nicholas Island off California. And the Navy has bowed to pressure and withdrawn plans to establish a practice range in the oil area of the Gulf of Mexico—a plan suspected of leading to another petroleum reserve.

But the Navy still cherishes its obsolete shibboleth of petroleum reserves, in spite of its record of going aground on the rocks of trouble every time it has sailed this perilous course.

THE HATCHES OUGHT TO BE battened down permanently on this ill-conceived nineteenth century idea. The whole concept of naval petroleum reserves is a lot of bilge water.

The Navy doesn't need petroleum reserves to get oil any more than it needs iron-ore reserves to build ships, or wool-ranch reserves to make uniforms, or pulpwood reserves to sustain its paper work. It would make just as much sense to set aside land for growing beans so the sailors can be sure of their staple diet.

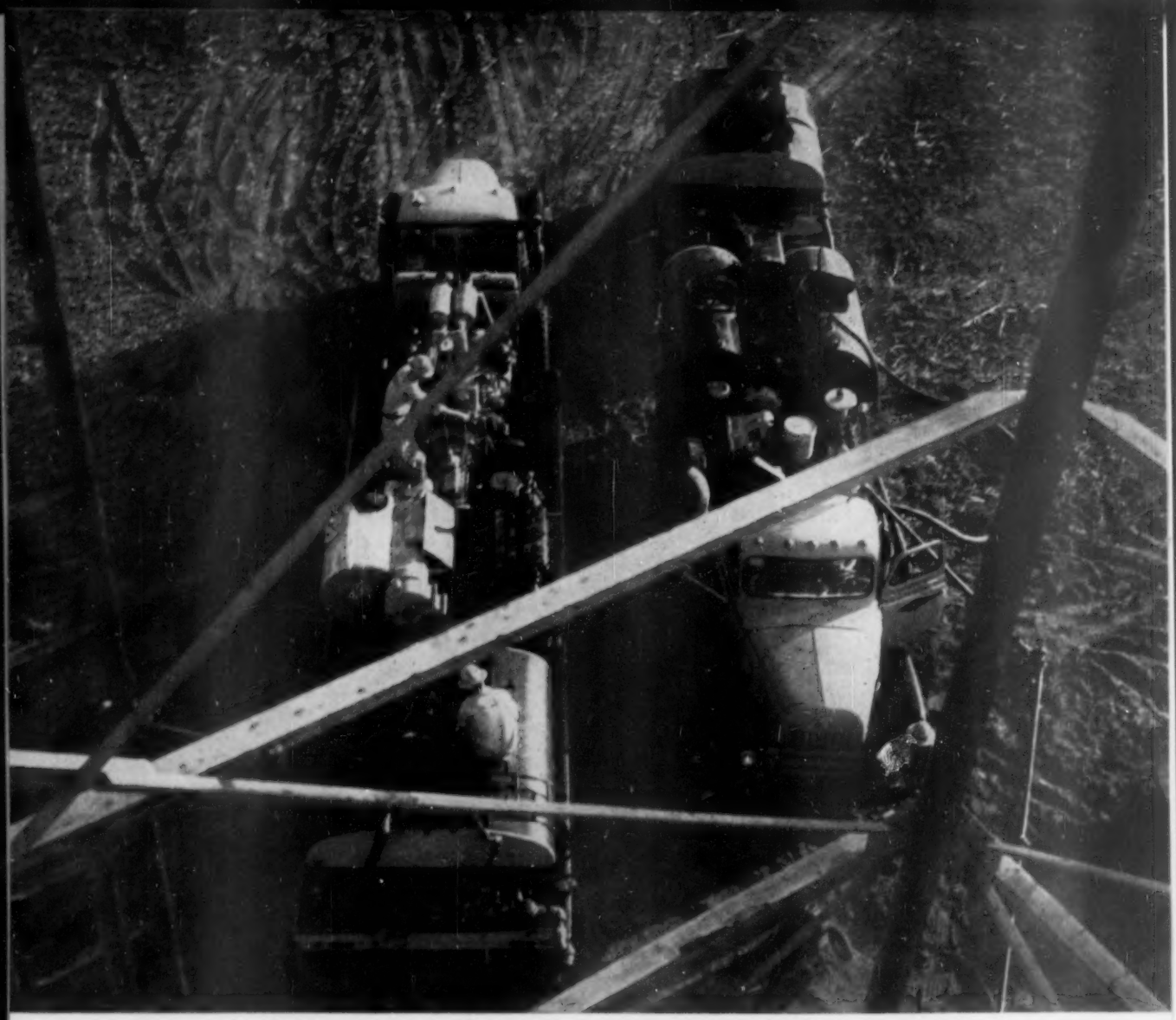
When the Navy—or any branch of the military—wants oil or any other commercial product in time of war it gets it from private industry, even though this means rationing the public. Industry has never failed to go all out to supply whatever the military needed in national emergencies.

The 40-year history of naval petroleum reserves has been a laughing-stock to the oil industry—but a tragedy to the taxpayers. For all its spending, the Navy owns only one halfway decent field—Elk Hills—and Navy ownership of it has never done anybody much good. Even in the desperate shortages of World War II it was held shut in until the final months and then its production was a piddling drop in the nation's oil barrel.

The discredited idea that the way to get oil for war is to drill a few discovery wells and then cap them until everybody else runs out ought to be relegated to the Navy's historical museum along with the boarding pike and the muzzle-loading cannon.

THE ONLY REAL petroleum reserve is a going, integrated oil industry with the facilities and know-how to supply the types and quantities of refined products needed by both the military and defense-supporting industries.

If the Navy will scuttle its attempts to keep likely prospecting areas out of the hands of an industry that has proved it knows how to develop petroleum reserves, the industry will see to it that the Navy and everybody else will have oil for future emergencies.



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The Industry This Week

Pipelines

• **Trans-Canada construction** may begin July 1 after 5 years on the drawing boards. The Canadian Parliament is expected to approve a $72 million loan providing 90 per cent of the cost for the 575-mile leg from Alberta gas fields to Winnipeg. Canada says it will build the entire 2,250-mile line itself if the private company defaults. P. 101.

Interprovincial crude line is being extended to the Toronto refining area. Extension will supply two refineries now served by tanker. And the 20-in. size indicates it may be taken on to Montreal later. P. 101.

New fight has erupted in Harris County (Houston) over right of pipelines to cross county roads without a permit. Magnolia is latest to be sued. County commissioner has removed company's new pipe from under road. P. 111.

Government

• **A new study of oil imports** is expected to be undertaken by the cabinet fuels committee. Its object: A more workable formula for controlling flow of Middle East crude into the U. S. P. 100.

Price cuts made in good faith to meet competition, already upheld by federal courts in "Detroit Case," may be allowed to stand. FTC will decide soon whether it wants to take issue again to Supreme Court. P. 104.

Production

• **World's deepest well** finally is completed as a producer. Latest test on ⅛-in. choke shows 206 bbl. oil daily from perforations at 21,419-35 and 21,443-65 ft. P. 101.

Two automatic custody transfer systems using positive-displacement meters instead of measuring tanks are being installed by Shell on its Brea Canyon leases in California. Switch to meters was prompted by prospective savings in tankage and labor. P. 108.

Drilling—Exploration

• **Drilling contractors** say they're being squeezed to death by rising costs and low footage prices. They blame cutthroat competition on oil company price-cutting policies. But companies claim contractors are to blame for their own troubles. P. 96.

A king-size leasing play is under way in southern Ohio. Kewanee Oil already has leased over 100,000 acres, aims for 500,000 in rank wildcat territory. P. 107.

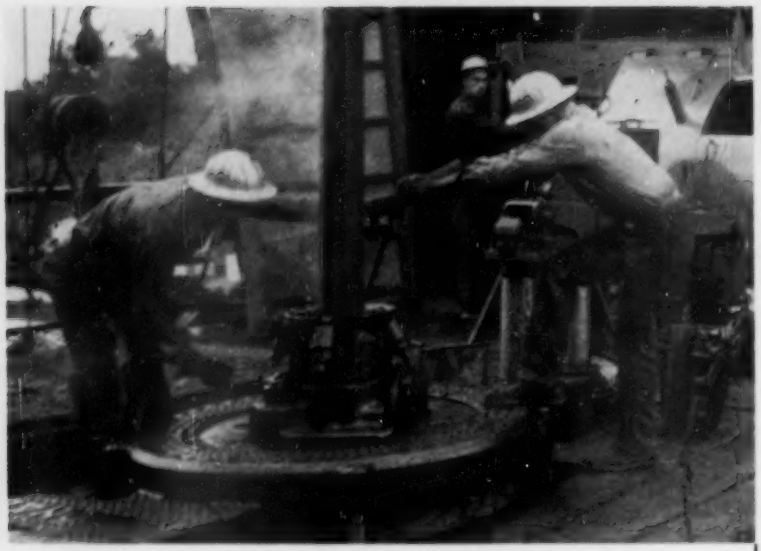
Russian propagandists are exploiting the Soviet turbodrill deal with Dresser. Russians claim it proves their superiority in some technical fields. P. 120.

Processing

• **One surprise in Tidewater's** Delaware City refinery now nearing completion is the small labor force needed to operate the plant. The 130,000-bbl. daily facility will use a staff of only 500. P. 100.

Two refineries, costing $30 million each, will be built in Colon, Panama. Government has signed contract with two Panamanian firms to build and operate plants. P. 116.

Partial operations have been resumed at Lion Oil's El Dorado, Ark., plant, shut down by a strike for weeks. Labor trouble, however, still ties up two other big U. S. refineries—Cities Service at East Chicago and Shell at Anacortes. P. 109.



What's Behind the Question

THE oil industry generally is in good shape. But one segment is showing signs of trouble. Many drilling contractors say they're being squeezed to death between rising costs and low prices for their work.

Cries of distress in this highly competitive field are not new. But continued pessimistic reports from reliable contractors justified a study. Journal staff members interviewed contractors —from one-rig operators to the majors—on the Gulf Coast, in the Mid-Continent, West Texas, the Rockies, and California. Since many complaints dealt with the policies of the oil companies, company officials were interviewed in the same areas.

The results boil down to this: The contractors are not prospering. In the contractors' opinions, their troubles stem from two sources: From oil-company policies, which have changed over the past few years, and, also, from within the ranks of the contractors, themselves. The article here deals only with the first source of concern.

Actually, the contractors' complaints are at direct odds with the statistics. The cold figures indicate nothing but good times. The industry last year completed 56,682 wells for an all-time record. Indications are that completions will exceed 59,000 this year. At the drilling peak last year, 3,338 rotaries were running —the highest since 1951—and an average week found 2,856 rigs at work.

But there's little consolation for the contractor in the figures. As one says, "If you drill one well at a loss, 10 more at the same price won't help."

NEXT WEEK . . . . In the Journal

Many of the contractors' woes are of their own making. They know it, and they're mercilessly frank in pinpointing their own faults. As one puts it, "We're cutting each other's throats as fast as we can."

Next week the Journal presents the contractors' own analysis of their self-imposed problems . . . and some of their own hints on what should be done about them.

Are Oil Firms

YES! Say the Contractors

EVERY drilling contractor wants to work for the oil companies, especially the majors.

It's considered the top work. A contractor is reasonably sure of getting his money from them. Also, if he does a good job, he may keep his rigs busy for a long time with one firm—because the companies have the big drilling programs.

This lure of steady work in one area means the contractor's crews can become efficient at making hole through the same formations. There are no long, expensive moves. Costs become stabilized. Chances for a good profit are better.

That may explain the bitterness of many contractors these days at policies of oil companies seeking to lower their drilling costs. Here's what they say is wrong in the oil companies:

Company "chiseling" . . . Complaints of contractors fit a pattern. They say first the companies "chisel down" prices by:

. . . **Job swapping for a nickel.** "The companies are looking for price," said one contractor. "Sometimes a bid differential of only 5 cents a foot is enough to sway them."

"Some companies don't consider whether the man getting the contract is qualified to do a good job. Often they don't even take his financial stability into consideration," said another.

"Many put every well up to bid. There was a time when a contractor who drilled a wildcat for a company was assured of sharing in the development wells. But that's out the window now. Contractors can't make money on wildcats."

. . . **Using a too-low bid** from a fly-by-night operator to pressure a reputable contractor to cut his price. "I've seen companies get a low bid from an unreliable contractor they never intended to give a job. Then they reject the bid, come to a reliable contractor, and try to get him to work for that price. Often he'll take it to get the job."

Another said: "I recently bid on a job for a major which was eventually given to a one-rig operator who obviously couldn't do the job. Right off the bat he got into trouble by not having enough drill collars. So the major came to me to help out.

Squeezing the Drilling Contractors?

"We rented the fellow the necessary drill collars which the major paid for. The net result was the job cost the company more than if we had gotten it in the first place even though our bid was a little higher. I had pointed this out before the bid was acted on—but it's the guy with the low bid who gets the business."

. . . Demanding free "extras." "Some companies keep demanding extras on rigs, added services. Some are willing to pay for them and some aren't. If these extras are not included in the contract and the company won't pay for them, the contractor is stuck."

. . . Sticking the contractor for company's poor geology. "I've made bids and gotten jobs on the basis of company geology. When the geology proves bad and the hole tougher to drill, the companies won't make any adjustments," one contractor said.

. . . Souping up company rigs to give a false impression of what can be done in fast drilling. Several contractors complained that companies often load their rigs with more horsepower and other equipment than actually required to drill their well. With this overrated equipment, plus use of top crews always available to the companies, unusual drilling rates are achieved. The contractors object that company officials then use this information to argue the contractor should take a job for less money.

"The companies are contributing to cutthroat competition," a Texas contractor said. "One major Texas operator, for example, has made a big study of drilling costs over a wide area. If you want to drill for this outfit, you've got to trim your price so you make only a small percentage profit."

Another drilling man said he felt the contractors are being made the "fall guy" in company drives to cut expenses. The companies can't do much about the higher costs of steel, supplies, services, labor, etc., but they can cut costs by beating down the contractors.

The problem of youth . . . The widespread entry of young engineers in company drilling programs has become a point of irritation and some trouble, contractors claim. They say the young engineers:

. . . Lack experience. "It used to be," an Oklahoma contractor said, "that contractors dealt largely with experienced company men who realized the value to the company of having a good contractor with good equipment to do a job for which he was satisfactorily paid.

"Now, too much of the work is handled by young men in district offices trying to make a good impression, trying to drill more wells for the same amount of money. They have no regard for the health of the contracting industry."

. . . Have too much control over drilling practices. A California contractor remarked:

"The oil company engineers demand too much control over drilling. They'll send some young engineer onto a derrick floor to tell the driller how to do his job. Then if a fishing job results, the contractor gets stuck."

A Gulf Coast contractor said in some companies "a young engineer insists that the contractor have certain type of equipment before accepting his bid. Some of these young engineers think they know all about pumps, draw works, and other equipment. But they don't actually know what it takes to get the hole down. The contractor often is the best judge of the type of equipment to use. He will use what he believes is best suited to get the job done."

Decentralization hurts . . . The rise in stature of oil field engineers is the result of a decentralization movement in the industry. Management has placed more authority over drilling at the division or district level. The aim is to speed up deals and let men familiar with local conditions make the decisions.

But contractors say the results have not all been good. They report it means:

. . . Spread-out contact work which adds to contractors' expenses. "It certainly has complicated our business," a Tulsa contractor said.

"Formerly we could station our contact men in a few oil centers, such as Tulsa, Dallas, Houston, Los Angeles, and maybe a few others and be in touch with most of the companies with wells to drill. Now with contracts being let by district offices we have to run all over the oil country to get business."

. . . Confusion in company policies. A Denver contractor remarked on the difference in policies and basic approach among district managers within the same company.

"Some districts will be headed by an experienced man who knows what our costs and risks are. He tries to be fair with us always and our relations are good. But in another district of the same company, an eager beaver who is anxious to move up in the company will cut us down at every chance."

"What we need," he added, "is for top management of the companies to understand the nature of our business. We can drill cheaper than they can with company rigs. But just a small profit margin often isn't enough in this crazy business. The risks are too big. We often lose enough on one troublesome well to wipe out all the profits from several other jobs."

Quality no advantage . . . A host of contractors joined in complaining that companies are putting less emphasis now on past performance and good equipment.

One California firm bid on a series of development wells in a field where two rigs would be kept busy a year. "We got the job," an official says, "but the major complained bitterly that we were overcharging him. So I said I would refund him every cent we made above our actual costs plus a small percentage. At the end of the year, I sent him a check for $36,000 and we haven't heard from him since. They have never asked us to bid on another job."

Another Tulsa drilling executive summed up the attitude of many others: "Reputation and quality of equipment means less than it should—it's pure price competition in the industry now."

In Denver, a contractor said, "We try to keep our rigs and equipment tip top. But we've found by bitter experience it often doesn't pay. We'll buy something new we think will let us drill faster. But when we start bidding on wells, we find we don't have any advantage. A competitor with older equipment will bid down the price to a point where we can't make the new stuff pay out."

Supply firms, too . . . Contractors also blame policies of some supply companies for increasing their troubles.

"By putting every Tom, Dick and Harry in the drilling business, they have increased competition," one Houston contractor claimed. His sentiments were echoed in Dallas, Tulsa, Denver, and Los Angeles.

The contractors said loose credit policies on new rigs and on old rigs which have been traded in on new ones have kept the number of rigs competing for business high.

Key to trouble . . . Contractors admit the core of most of their troubles is low footage prices.

One explained it tersely. "Today a foot of hole is about the biggest bargain in the oil industry," he said. "Contractors have tried to reduce their costs but they are up 102 per cent since 1941.

Penetration rate is up 88 per cent and drilling days are about 56 per cent of those required in 1941. But the footage prices are 4 per cent less."

It all adds up to trouble for drilling contractors, he said—at a time when oil companies generally are showing their greatest profits.

NO! Say the Companies

IF drilling contractors are going bankrupt, it's their own fault. So runs the comments of major oil companies who buy drilling services. They deny their policies are to blame.

Production officials who supervise most of their companies' drilling contracts report they are:

. . . **Not chiseling** on footage prices. Field prices or the going rate in an area still mean something.

. . . **Emphasizing past performance,** financial stability, and adequate equipment of contractors who work for them.

. . . **Willing to allow fair profit** to contractors. The companies want contractors to stay in business, claiming they can drill cheaper and more efficiently than the companies themselves.

What's at fault . . . Company officials show mixed reactions to the question whether contractors are making money.

Some majors feel the contractor's prices are too low. Others steadfastly claim that contractors working for them will show handsome profits. In either case, the officials think if the contractors are in trouble it is caused by:

. . . **Too many contractors** and rigs in business. The marginal operators and old rigs are depressing business for others.

. . . **Inefficiency.** This extends in some cases from top drilling management down to drill crews.

. . . **Poor bidding.** Contractors or their contact men often don't know geology, don't get enough information on the proposed well and consequently may get into trouble by bidding too low. Or they may cut their own prices without any reason.

They're making money! . . . One major production chief, when confronted with complaints of contractors, said "you've talked to most of the poor business men in the drilling industry."

"The contractors with good equipment, good crews, and good management are making money," he said, adding:

"An industry as profitable as drilling naturally attracts plenty of inefficient men. They get an old rig, some financing, and start in business. They don't have the know-how themselves and often don't have anyone in their organization who has any savvy. Naturally these fellows get into trouble."

This company official said, "we know the men we deal with and often invite bids from the same contractors. We know their equipment and their ability to perform. We think we know their costs and believe there's a margin of profit in the rates we pay."

He added one new concept. "The key to whether a contractor does lots of work for us is whether our field man can work smoothly with his tool pusher. If they hit it off, the wells drill faster and we both save money. The bulk of our drilling is on day rates. Under that setup, inefficiency or slow drilling costs us."

He concluded by saying, "Contractors generally have done a swell job in raising their efficiency, cutting costs and reducing drilling times. That's the whole basis of our progress and everyone saves by it."

But some ARE hurting . . . Another veteran production chief for a major, however, says he thinks drilling contractors are working too cheaply. But he added that contractors working for his company weren't losing money.

This company bids its drilling work. But only contractors whose ability and equipment is known are allowed to bid. If a new contractor asks for work, his equipment and financial rating are examined. If the company is satisfied, he is allowed to bid.

On the bulk of wildcatting, this company puts contractors on day rate and for this reason must have a competent crew on the job. The contractor who drills the wildcat has the best chance to drill development wells, the official said.

"We like to keep a contractor in the same area. It actually costs us less because we, too, can profit by his increased efficiency and fewer moves."

This official reported after a wildcat and two or three development wells are drilled in a new area, a field price is negotiated with the contractor. Naturally, it's usually lower since most of the drilling conditions are known and the contractor's crew has become efficient in making hole in the area.

His company several years ago made a private survey of drilling company costs and profits and determined that the average return was 5 per cent.

He added, "I've heard the complaints of the drilling contractors so often lately, there must be some truth in many of them. But my company is not trying to beat drilling prices down."

Most other majors reported they let drilling projects on low bids from reliable contractors. One official summed up their views when he said, "We're not knocking down prices. But we are out to drill as cheaply as possible. If a good contractor bids low on a well, he gets the job. It's his business what he charges."

How some operate . . . Two major companies which contractors singled out as being exceptionally fair proceed on a slightly different basis.

One uses a select list of contractors with good equipment, pays a fair field price both on footage and day rate, and in unusual cases of trouble makes a settlement with the contractor.

The other deals only with contractors who have equipment to handle the well and whose companies are financially reliable. This company official reports "if we bring a contractor in on a wildcat and he proves satisfactory we give him a program of wells and negotiate for prices."

He explained, "We feel this allows the contractor to become efficient. Over the long run we've found this is better and cheaper than throwing every well open to bids. Our drilling costs reflect this."

Another policy of this major is its use of day-rate work whenever possible. "We find over-all day-rate work is cheaper," the official said. "We buy the contractor's risk. Since we can spread the risk of down time due to trouble over a large number of wells, we think it's cheaper for us than letting the contractor assume the risk."

This official thinks the contractors have some legitimate complaints at present prices. He says the drilling contractor can drill cheaper than the majors. They have less overhead, lower labor costs; their moves are cheaper. He criticizes management in some operating companies for holding too narrow a view on price cutting.

Investigation would help . . . Contractors often are to blame for their trouble, says one official. "Some contact men for the contractors don't know enough about geology to ask intelligent questions when they come over here to look over a well," he said. "Naturally they're likely to make poor bids. Some others don't even bother to study our geology or inform themselves on conditions concerning the well. They just bid."

Another major representative blamed contractors for undercutting their own

bids. "I had a contractor who finished one well for us come in and cut the going rate for another well. We feel it's their business what they'll work for."

A company official in Texas says "The trouble with contractors is that most will never come to the company and talk about a job before they submit a bid. If a contractor thinks he is having trouble with a company he should talk to that company before he bids."

This official cited a recent example on a 11,500-ft. contract in Louisiana. Six contractors were invited to bid. Drilling was to be on a footage basis to 10,800 ft. where protective casing was to be set. Day rates were to prevail from there on down. All six contractors required the contract to include the "Gulf Coast clause," to protect them from notorious heaving shales in the area. Under this clause the contractor automatically goes on day-rate work to total depth from the point where he must use 12½-lb. mud.

One contractor investigated. He figured that in this area under the clause he would go on day-rate work at 9,500 ft. instead of 10,800 ft. He bid $2 a foot less than the others and got the job. Just as he figured, he went on day rates about 9,500 ft. and made a nice profit on the hole.

"His bid was in line," the official said, "because he had investigated. The others were out of line and would have made an extra $20,000 or so on the well."

Why company rigs? . . . Companies which operate their own drilling rigs say they are usually losing propositions and deny their purpose is to knock down prices.

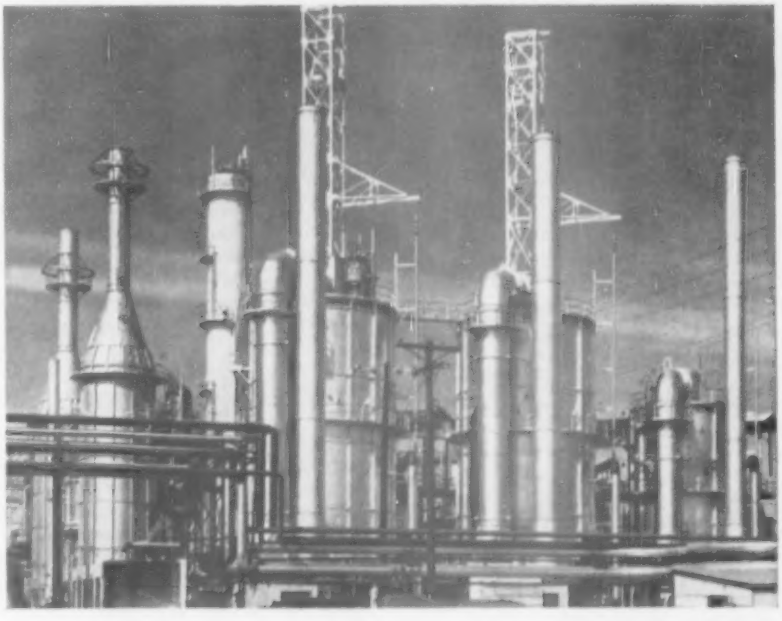
The companies contend the rigs are primarily used in uncharted drilling areas. Usually the operator or contractor neither knows what he might run into or what is a reasonable bid. Also the company may feel its own rig which has highly efficient and reliable crews might do a better job on a certain well even though a contractor might do it cheaper.

Companies also point out their rigs are laboratories. They can test new drilling tools or techniques to speed drilling rates or lower costs. They argue discoveries thus tested often turn out to help the entire drilling industry.

What's "fair" . . . Company officials emphasize that drilling for oil is a risky trade. They admit they know no way to eliminate that factor.

All claim that the companies need the drilling contractor and they are willing for him to make a fair profit. The rub is deciding what is fair.

Top Hands Get the Facts on . . .



. . . Sinclair's New Cat Reformer

HOUSTON. — Sinclair Refining Co. had an open house at its refinery recently, but this one was for its own plant supervisors.

When it recently placed a 24,000-bbl. per day catalytic reformer on stream, Sinclair decided to brief supervisors throughout the plant on the new unit. The result: an overflow crowd at the discussion session in the reformer's control room.

Top refinery personnel had been exposed to these proceedings in the past whenever construction was completed on new units. The interest shown then convinced Sinclair the sessions should be opened to supervisors from all departments, including maintenance, clerical and operations. The heavy turnout came despite the fact the men had to return to the plant after working hours.

The new reformer is a fixed-bed reactor-heater series flow unit using Sinclair Baker RD-150 catalyst.

New Import Study Due

ODM expected to reveal how oil companies have complied, ask for a more streamlined formula to control problem

WASHINGTON.—Another study of oil imports is expected to be undertaken by the cabinet fuels committee in a new effort to reach a workable basis for control of Middle East imports.

The Office of Defense Mobilization has written a review of the effort to keep imports in line with their 1954 relationship. It may be made public this week. It also may be accompanied by figures showing the extent to which importing companies have complied with the Government's recommendations.

Some sources here believe progress has been made on imports control. But there are indications that further steps will be necessary. These may be outlined in the form of suggestions to the companies. Or the cabinet committee may be asked for a new study and a new approach to the problem.

Exemptions . . . Any new formula drawn up may be based on stripped-down data which will bring out clearly the imports and area which form the hard core of the problem.

Mobilization Director Arthur S. Flemming took Canadian and Venezuelan oil out of the picture last October. At that time he called on importers to reduce their entries of crude from other areas. He suggested they be held to 7 per cent less than their original programs for the period April 1-December 31, 1955.

It since has been proposed that the West Coast be ignored in figuring imports. Another suggestion is that bunker fuel for reexport and military purchase also be taken out.

The resulting figures would show the volume of Middle East imports competing in the area east of the Rocky Mountains with domestic oil.

Supporters of these proposals argue that West Coast imports have little effect on operations east of the Rockies. The West Coast must depend on imports, they say, since California operators already are producing all they can.

Bunker fuel not to be used in this country and military purchases likewise should be taken out, they contend. These do not compete with domestic oil going into the consumer markets.

Little talk . . . Little has been said about imports in government circles for several months.

The Office of Defense Mobilization, however, has been giving continuous study to the subject. It has been seeking a better method of achieving the balance recommended by the cabinet committee. The program hastily devised a year ago was designed to quickly meet the demands of domestic producers and the then-distressed coal industry for control of imports.

Flemming also may call for another study of the residual fuel oil situation. Imports of residual were brought into line with the cabinet formula early last fall. Toward the end of the year, the pressure was for larger imports to meet demand that could not be filled from domestic sources.

The new study would show whether the import program should be further relaxed to meet the estimated requirements of the next heating season.

Socony Boosts Octanes

NEW YORK.—Socony Mobil Oil Co. has announced a new regular-grade gasoline and a boost in the octane of its premium grade.

The new regular, called "Mobilgas R," will give knock-free performance in most pre-1955 cars, Socony says. The company claims the premium gas has been boosted in octane to satisfy "even the most critical new car designed utilizing super-compression engines." Both the regular and premium contain a blend of four additives called MC-4.

Socony has a new pitch for sales this motoring season. The company has developed a gasoline selector that lists car makes and models and indicates which grade of gasoline is needed.

New Offshore Entrant

SHREVEPORT, La.—A new offshore drilling company has been formed by a Shreveport independent contractor and two mining concerns. The company will operate in the Gulf of Mexico.

The new corporation is Trahan Exploration, Inc. It was formed by J. C. Trahan, American Metal Co., Ltd., and Cerro de Pasco Corp. Trahan is president. Other officers are Thornton Tarvin, H. Danforth Starr, and John Payne, Jr., vice presidents; Michael D. David, secretary; Hans Vogelstein, treasurer; George H. Cain, assistant secretary; and Erwin A. Weill, assistant treasurer.

Trahan Exploration plans to take delivery of its first drilling barge late this year. It will operate in up to 50 ft. of water, with an 18,000-ft. drilling-depth capacity.

Tydol Cuts Costs

New plant means big labor savings; surprises in store

NEW YORK.—Tidewater Oil Co.'s nearly completed Delaware City refinery, with half again as much capacity, will require less than a third of the operating manpower needed at the firm's old Bayonne, N. J., plant, sold last year.

The Bayonne refinery had a capacity of 87,500 bbl. and employed 1,650 workers. The new 130,000-bbl. refinery will need only 500. But construction cost of the unit has been going up—it's now projected at $175,000,000 to $185,000,000.

These figures were released by D. T. Staples in his president's report to shareholders. Staples also revealed the Bayonne plant sold for only $6,500,000, although it had been taxed on a valuation of $15,000,000.

The company, whose new name is now official, expects its Delaware City refinery to go on stream during the fourth quarter of this year. The big installation is being kept under partial wraps, but it's understood that it will contain some surprises for the industry.

Officially announced are the 130,000-bbl. crude unit, a 102,000-bbl. Orthoflow fluid catalytic cracking unit and a 42,000-bbl. fluid coker. All three will be the largest of their types ever built.

Although not confirmed, the company is understood to be including a 45,000-bbl. Houdriforming unit. This may be designed to permit extraction and recycle of lower-octane components in the reformate fraction.

Tidewater is also reported to be building a catalytic hydrodesulfurization unit to process sour crude. It would utilize reformer hydrogen, supplemented by hydrogen production from refinery gases.

It has not been definitely learned whether the company will include polymerization or alkylation facilities.

Prorated Fields Get Break

AUSTIN.—The Texas Railroad Commission has given producers in Round Top field of Fisher County two more producing days this month since Cities Service Oil Co. is now able to raise purchases to 80 per cent of normal.

This increases Round Top producing days to 14 as compared to the statewide 16.

Cities Service had been restricting oil purchases to 60 per cent of normal due to a strike at its East Chicago, Ind., refinery.

The commission cut producing days of seven other fields where Cities Service is a buyer so that output would remain ratable.

They were: South Leuders field, 13 days; Block 12 field, 7 days; Block 12 East, 15 days; Elkhorn (Ellenburger), 15 days; Shafter Lake (Devonian), 15 days; Shafter Lake (Wolfcamp), 15 days; and Shafter Lake (Yates), 13 days. South Leuders is in Jones County, Elkhorn in Crockett County, and the rest in Andrews County.

Oil Syndicate Organized

DALLAS.—Stekoll Properties, backed by a Los Angeles syndicate of businessmen with cash resources of $20,000,000, has been formed to purchase and operate oil and gas properties in the U. S. and Canada.

M. H. Stekoll, president of Stekoll Petroleum Co., Dallas, will be management consultant and property operator for the syndicate.

"Because of their emphasis on economical operation, we feel that this company is in a position to get the most out of producing properties," the syndicate said of Stekoll Petroleum.

Stekoll, petroleum-engineering graduate of Stanford University, is the son of the late Harry Stekoll, Latvian political refugee who came to the United States in 1914. After prospering in the pipe business in Tulsa, Harry Stekoll entered the oil business in Oklahoma and Borger, Tex., in 1926. The company he founded now owns around 300 producing wells in Corsicana and Borger fields of Texas, and the Independence, Kans., area.

Canadian Line Will Expand

TORONTO.—Imperial Oil, Ltd., will boost the capacity of its 188-mile Sarnia-Toronto products pipeline to 76,000 bbl. daily—an increase of one-third.

The company plans to loop 38 miles of 12-in. pipe from Waterdown to its new terminal in North Toronto. Additional pumping equipment will be installed at Sarnia, London, and Waterdown.

Total cost of the project has been estimated at $1,750,000. Work on the loop is scheduled to start in July. Completion is set for September.

Interprovincial Expanding

Big Canadian crude line will build east from Sarnia to Toronto; line will replace tanker service to two plants

TORONTO.—Interprovincial Pipe Line Co. has made a long-expected announcement of plans to extend the eastern end of its crude line.

The company has applied to the Board of Transport Commissioners to build a 150-mile extension from Sarnia to the Toronto refining area. The extension would be 20 in. in diameter.

Interprovincial plans to serve two Ontario refineries with the extension. But requirements of these plants will take only a portion of the line's capacity. These plants are British American Oil Co.'s 21,500-bbl. refinery at Clarkson and Regent Refining, Ltd.'s 14,000-bbl. plant at Port Credit. Both are now getting crude by tanker from Superior, Wis.

Port Credit is expected to grow as a refining area. Regent is expanding its Port Credit plant to 20,000 bbl. daily and there have been reports Shell Oil Co. will build a 40,000 to 50,000-bbl. refinery there. Shell has purchased a large tract at Port Credit, but has not announced plans for a refinery.

On to Montreal? . . . The 20-in. size of the extension indicates the line eventually will be extended to the Montreal refining area, which has a daily capacity of 240,000 bbl. Montreal is supplied largely by Venezuelan and Middle East crude through the Portland-Montreal Pipe Line System from Portland, Me.

It has been predicted that eventually it will be expedient to partially offset these imported supplies with larger shipments through Interprovincial in order to provide additional outlets for Western Canadian crude *(The Oil and Gas Journal, April 9, page 64)*.

The 644-mile Lakehead leg of Interprovincial is 30 in., indicating that the company may increase the capacity to Sarnia to several hundred thousand barrels daily. The capacity could be expanded to handle deliveries to Sarnia as well as current needs of both Toronto and Montreal.

If the Interprovincial extension is approved, construction will begin in the spring of 1957 and be completed in the fall.

Interprovincial is moving about 190,000 bbl. daily through its 1,773-mile system. The company announced early this year it plans to increase the throughput to 214,000 bbl. daily during 1956. Construction is scheduled to start this spring on looping of the line between Cromer, Man., and Clearbrook, Minn. The line originates at Edmonton.

New record is now official . . .

. . . Deep Test Finally Completed

PORT SULPHUR, La.—Richardson & Bass has completed the world's deepest well as an oil producer.

The company moved the rig to a nearby dry hole and will deepen it to what may be the second greatest depth ever attained.

The record-depth well, the 1-L Humble-L.L.&E., was completed May 5 in two sections of the Miocene. On a late test through ⅛-in. choke it flowed 206 bbl. of oil per day from perforations at 21,419-35 and 21,443-65 ft. The two sections, only 8 ft. apart, apparently are separated by a shale break.

On an earlier test, the well flowed oil at the rate of 500 bbl. daily from the lower interval. The producing rate dropped off sharply, then stabilized somewhat before the upper section was perforated.

In the latest test, tubing pressure was recorded at 1,700 psi. and casing pressure at 1,100 psi. The flow contained 0.3 per cent fresh water and mud. Gas-oil ratio was 1,398 to 1. Corrected gravity of the oil is 43°. It previously was announced as 38°.

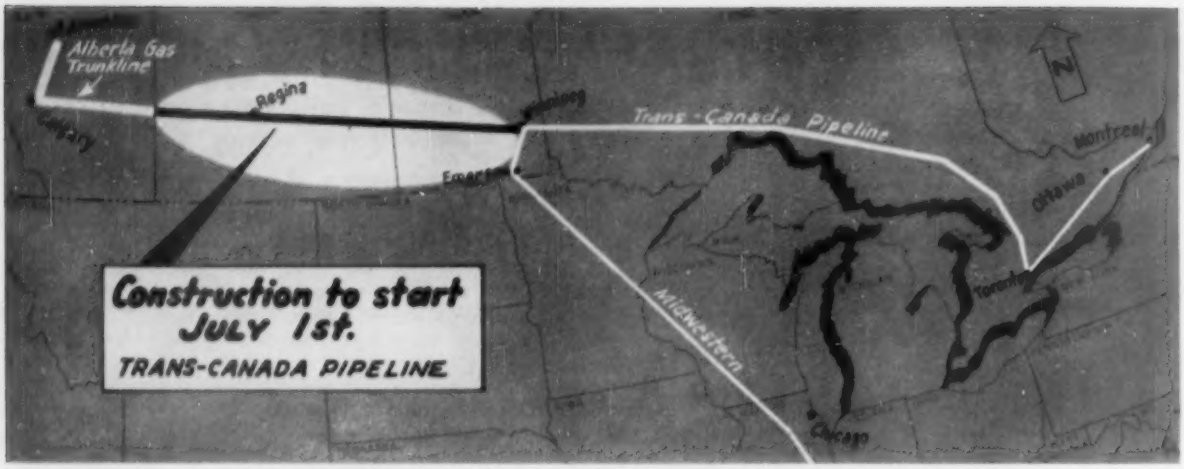
The well, originally drilled to a record 22,570 ft., is the deepest ever to produce oil or gas.

Associated in the history-making venture with Richardson & Bass are John W. Mecom and Freeport Sulphur Co.

The same operators moved the rig about 2 miles east of the record holder. Late last week they were preparing to deepen the Humble Oil & Refining Co. R. F. Price et al. No. 1 State Lease 2345, also in Plaquemines Parish.

Projected depth is 22,500 ft. which, if reached, would make this test deeper than any other well ever drilled except the new record holder.

The Humble-Price test was abandoned in July 1954 at about 11,500 ft.



Trans-Canada May Be Started July 1

Construction of Alberta-Winnipeg leg could begin then if Parliament grants cabinet proposal for $72-million loan

Canada expresses determination to construct line even if FPC rejects T.G.T. plans to import gas for sale in U. S.

CALGARY.—The 5-year struggle to build a pipeline linking Alberta's prolific gas fields to eastern Canadian markets 2,250 miles away may be near a successful end.

The Canadian Government's decision to lend Trans-Canada Pipe Lines, Ltd., $72 million of the $80 million construction cost moves the 575-mile Alberta to Winnipeg leg a big step closer to reality.

Parliament must go along with the cabinet on the loan. But the Liberal government, which is sponsoring the loan, has more than enough votes in the House of Commons to assure approval. And the Senate traditionally follows suit.

A resolution was to be introduced in Commons last week renewing the agreement with Ontario for the $118-million crown corporation. The provincial government is to put up $35 million of the cost of building the uneconomic northern Ontario portion. The proposed loan would be part of this resolution.

July 1 is mentioned as the starting date, if the loan goes through by June 1. The government will require completion this year under terms of the loan. A goal of November 1 is being talked, but a member of the combine which will manage construction said December would be more realistic.

Trade Minister Howe, explaining the loan offer, said if the government abandoned Trans-Canada now, construction could not begin this year. The $375-million line, which is to be carried eventually to Montreal, might be delayed even beyond 1957, he added.

The loan, repayable in 9 months, would bear 5 per cent interest. Should Trans-Canada default, the Canadian Government would take over its assets. Howe said Canada is prepared to take over the entire line and complete it if the private owners are unable to do so.

The feeling in Canada was that for the first time since the inception of the ambitious project, its construction was virtually assured. There was confidence that it could go ahead even without approval of the gas export agreement with an affiliate of Tennessee Gas Transmission Co., a Trans-Canada partner, whose application to sell Canadian gas through the Midwest is being debated before the U. S. Federal Power Commission.

Construction challenge . . . Trans-Canada contractors face a tremendous hurry-up job in lining up the manpower and heavy pipe-laying equipment for the huge project.

This will be the first 34-in. pipe laid in Canada. Most of the equipment will have to come from the United States.

About seven spreads are expected to be used, giving each around 80 miles to build. Construction should go rapidly across the flat prairies of southern Saskatchewan and Manitoba. But cold weather this autumn might cause some delay.

Another potential threat of a delay is a steel shortage. This would materialize only in the event of a steel strike, however, and none is expected. The steel industry will probably settle quickly with the union steelworkers when their contract expires July 1.

Trans-Canada pipe already is being delivered to rail points along the route of the line, but it is understood that steel mills will be rolling pipe for the project until September.

All preliminary work has been completed. Design and engineering was done by Bechtel-Mannix-Hester, a combine representing Canadian Bechtel, Ltd., Toronto; Mannix, Ltd., Calgary; and Oklahoma Contracting Co., Dallas. The group is to manage construction. Some 80 per cent of the right-of-way options have already been obtained.

Gathering system . . . The gathering system, to be built by Alberta Gas Trunk Line Co., Ltd., will be a major project itself, requiring 120,000 tons of pipe.

With 74 miles of 34-in. from the Alberta-Saskatchewan border westward, and a few hundred miles of 8 to 30-in., the system will cost an estimated $52 million.

No delay is anticipated from this end. The gathering lines are expected to be ready to start delivering gas in December if necessary. Most supply contracts have already been signed and one major field processing plant has been started.

The first plan was to build the gathering system in three stages, with only $14 million in construction needed to supply first-year requirements. It will be extended to other fields as supply needs increase.

Export-import plan . . . Midwestern Gas Transmission Co., a T.G.T. company, will build a 1,112-mile pipeline from Portland, Tenn., to the Manitoba border near Emerson if the FPC gives the go-ahead for its plan. It will be 12, 16 and 24-in.

The goal to start deliveries of Alberta gas was announced for November 1, 1956, when the application was filed last October. But pipelines whose markets Midwestern would invade are fighting the plan, and FPC hearings are still in progress. It isn't known when a decision can be expected.

Midwestern would buy 200,000,000 cu. ft. daily from Trans-Canada at first and double that amount when gas becomes available. T.G.T. in turn would deliver up to 86,755,000 cu. ft. daily near Niagara Falls to serve and develop markets between Toronto and Montreal pending completion of the all-Canadian line.

The initial U. S. market was considered essential to make Trans-Canada's private construction feasible. But surprisingly good industrial markets are reported being lined up in the northern Ontario area, where prospects were considered poor.

There is strong Canadian sentiment to build the line, regardless of whether the export deal to the U. S. goes through. And the government appears determined to do so on the theory that an all-Canadian project should not be dependent on a decision by a foreign government agency for its success.

Rival backs out . . . Canada's loan offer was made shortly after a Trans-Canada rival withdrew his proposal to build an all-Canadian line wholly with private capital.

Frank McMahon, president of Westcoast Transmission Co., Ltd., explained that Trans-Canada was in the preferred position to build the line soon. He said he did not wish to jeopardize the "government-favored" project.

But he attacked the Trans-Canada scheme on several points, and left the impression he would be willing to re-enter the picture should Trans-Canada become unable to carry on. McMahon charged that:

. . . It is not in the best interests of Canada for surplus Alberta gas to be sold to Midwestern at a price substantially below that which existing pipelines in the U. S. are able to pay.

. . . The projected plan to sell gas at Niagara to T.G.T. for development of underground storage fields in New York rather than in southern Ontario would not benefit the eastern Canadian consumer.

"I also believe that the plan of the Tennessee-Midwestern company to raid the markets of these existing pipelines in the Great Plains-Midwest area can meet only with protracted delay before the Federal Power Commission of the U. S.," he declared.

McMahon appeared to have gathered around him the pipeline groups which are opposing the Midwestern application before the FPC. He was reported to have lined up sales totaling 400,000,000 cu. ft. daily at a price 5 cents per M.c.f. above the rate at which Trans-Canada is to sell to Midwestern. Large sales of gas also were to be made to industry in the Hamilton, Ont., area.

Another feature of his scheme was development of 75 billion cubic feet in underground storage facilities in depleted wells owned by Union Gas Co. in Ontario. The aim was to eliminate the need for later spill-over sales to U. S. interests at Niagara and permit operation of the pipeline every day of the year.

Parliament opposition to Trans-Canada was ready to make the most of McMahon's proposal, which called for majority ownership by Canadians, when it died as suddenly as it had come to life a month ago.

Peace River outlet nears as . . .

. . . Westcoast Laying Gas Line

VANCOUVER. — Westcoast Transmission Co., Ltd., is approaching what will be the peak construction period on its big-inch gas line.

Construction started several weeks ago on the 650-mile gas pipeline from the Peace River area of northern British Columbia and Alberta to the U. S. Pacific Northwest.

Westcoast Transmission kicked off the big project at the international border between Washington and British Columbia's southeastern tip. By midsummer, 2,000 men will be at work on the line. Completion is expected by the fall of 1957.

Financial arrangements have been completed and approval has been granted by the U. S. Securities Exchange Commission. The deal insures that control of Westcoast Transmission Co. will remain in Canadian hands, despite future stock transactions.

Cost of the line is now expected to hit $153 million. It is the largest private venture in Canada's history.

Some 75,000 tons of 30-in. pipe is being delivered by South Durham Steel & Iron Co., Ltd., of England. Initial shipments have landed over 5,000 of the 40-ft. lengths in British Columbia. Seventeen ships are due in Vancouver by September 25 to complete the order.

Meanwhile, right-of-way is being burned off before the summer months arrive. There is a government ban in Canada on burning during the hot, dry period.

The line will run generally along the Fraser River valley from the Peace River area to Sumas, Wash., where it will hook up with Pacific Northwest Pipeline Corp.'s line from San Juan basin. Capacity of Westcoast Transmission's line will be 600 million cubic feet daily.

Atlas Plans Oil Combine

Odlum waits stockholder approval to merge 4 companies he controls into single oil-operating subsidiary of Atlas

NEW YORK.—The oil and gas interests of four of the five companies expected to merge this month with the mammoth Atlas Corp. probably will be grouped into a wholly owned oil-operating subsidiary of the new Atlas.

The four companies have proved net reserves estimated at more than 5,000,000 bbl. of crude and 108,000,000 M.c.f. of natural gas. The reserves are located in seven states and Canada.

They already are a part of Floyd Odlum's scattered and varied investment empire. But if stockholders approve, and this is regarded as a mere formality, the four with oil holdings and one other, RKO Pictures Corp., will become a part of Atlas Corp.

The surviving company, Atlas, will continue to be a closed-end, nondiversified management investment company, Odlum revealed this last week after the Securities and Exchange Commission approved the merger plan.

Atlas will have total assets of about $110 million with about one-third of them in uranium holdings.

Second ranking field in which the company will be interested is oil and gas. The combined oil and gas holdings of companies in the merger proposal total about 12 per cent of total assets.

The stock plan . . . The present common stock of Atlas will be converted into four shares of the new Atlas common. Here's how the other stocks will be converted:

. . . Two and four-tenths shares of new Atlas common for one share of Airfleets, Inc., common.

. . . One share of new Atlas common for one of Albuquerque Associated Oil Co.

. . . Four new Atlas common for five and one-fourth of RKO Pictures Corp.

. . . Two and four-tenths of new Atlas for one of San Diego Corp.

. . . Thirteen of new Atlas for one share of the cumulative preferred of Wasatch Corp. and one and three-tenths of the new Atlas for one Wasatch common.

Stockholders of Airfleets, Albuquerque, San Diego, and Wasatch will meet May 23 to act on the merger. RKO owners will meet 2 days later.

The assets . . . The oil and gas properties of Wasatch Corp., San Diego, Albuquerque, and Airfleets last year produced about 1,500 bbl. daily of oil and 2,000 M.c.f. daily of gas. They also control a net 25,000 acres of undeveloped oil and gas properties in Arkansas, Colorado, Kansas, Louisiana, Nebraska, New Mexico, Oklahoma, Texas, and Saskatchewan.

About 1,000 bbl. daily of the 1,500 bbl. production now goes to former owners through production payments. These obligations will be liquidated by the end of 1958, however, and the entire production then will accrue to the new Atlas company.

Here's what the four have:

. . . Wasatch. It was organized in 1928 to acquire Italian utilities but has disposed of all its European holdings and now has both uranium and oil-gas interests. The company has 2,761 net productive acres in Arkansas, Kansas, Louisiana, Oklahoma, and Texas with interests in 285 oil and 7 gas wells. Wasatch has 3,587 net acres of undeveloped properties. Its net production last year was about 850 bbl. daily.

. . . Airfleets, Inc. It owns one-half interest in the former properties of Wren Oil Co., Tulsa, in Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, and Texas. They total 1,104 net productive acres with interests in 260 oil and 7 gas wells plus 14,500 net undeveloped acres. The properties produced about 260 bbl. of oil daily.

. . . San Diego. It holds the other half of the former Wren oil properties. In addition the firm has acreage in Colorado, Nebraska, and Saskatchewan. The company has 1,874 net productive acres with interests in 280 oil and 7 gas wells and another net 5,771 undeveloped acres. The properties produced about 430 bbl. of oil daily last year.

. . . Albuquerque. This company merged with Bolack Oil & Gas Co. of New Mexico last June and has 6,105 net acres of producing leases plus proved and undeveloped leases and producing overriding royalties in the San Juan basin of New Mexico. The properties produced about 8,000 net barrels of crude last year and more than 700,000 M.c.f. of gas.

Good-Faith Price Cuts Upheld

WASHINGTON. — The 16-year-old issue of good faith in meeting price competition, raised in the famous "Detroit case," may finally be close to settlement.

The U. S. Circuit Court of Appeals at Chicago held that Standard Oil Co. (Ind.) did not violate the Robinson-Patman Act in quoting lower prices to four customers in the Detroit area than it offered other buyers. Now it is up to the Federal Trade Commission to decide whether it wants to take the matter again to the Supreme Court, which threw out its original order in 1953.

If the FTC doesn't appeal, an important principle is laid down. The "good faith" clause of the act means just what it says—that the quoting of lower prices to individual customers to meet the low prices of a competitor is legal.

This was the first major issue raised under the antiprice discrimination act. The FTC filed its complaint in 1940. It issued a stop order in 1946. The circuit court upheld the order, but the Supreme Court reversed it.

A "modified" order was issued by the commission in 1953. Standard contended it was merely a rewording of the original nullified order and went back to court. This time the circuit court unanimously supported the company.

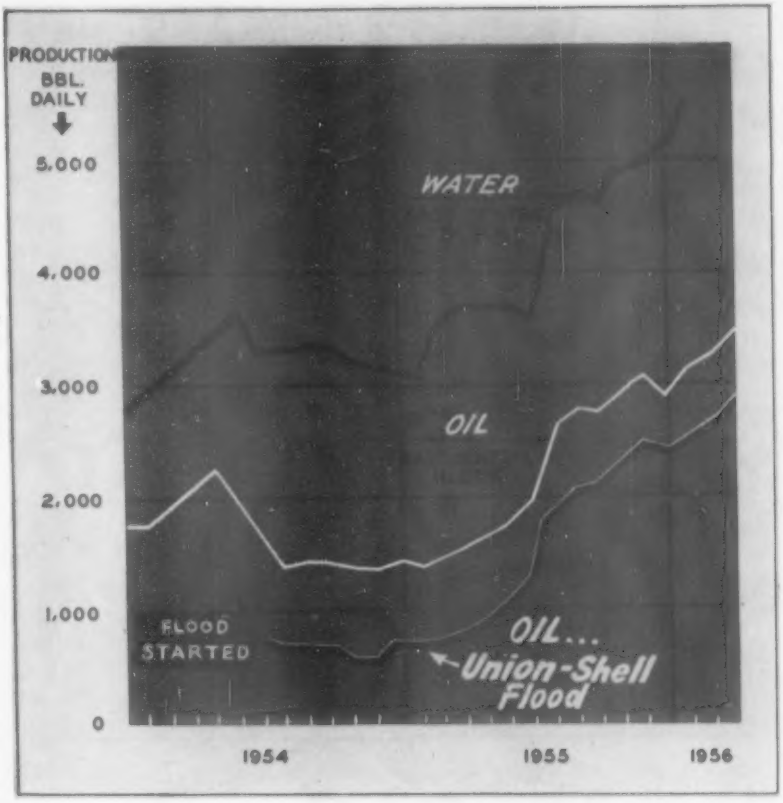
The court has some unkind things to say about the FTC's views. It had some very pertinent things to say about business and competition. One of them was a quotation from the Supreme Court opinion:

"If a large customer requests his seller to meet a temptingly lower price offered to him by one of his seller's competitors, the seller may well find it essential as a matter of business survival to meet that price rather than to lose the customer."

Standard of Indiana commented that the court, had it ruled otherwise, "would have established a principle that would seriously injure the competitive system which the Supreme Court has said is the heart of our national economic policy."

The company referred to the Supreme Court opinion which stated:

"The heart of our national economic policy long has been faith in the value of competition . . . It is enough to say that Congress did not seek by the Robinson-Patman Act either to abolish competition or so radically to curtail it that a seller would have no substantial right of self defense against a price raid by a competitor."



Flood Has Impressive Record

LOS ANGELES. — The water flood being carried out in a 4,200-ft. 120-acre pool in Dominguez field near here has caused oil production to climb from 600 bbl. to about 2,800 bbl. daily. And output is still climbing.

The project, California's first full-scale flood, is a cooperative undertaking of Union Oil Co. and Shell Oil Co. A water barrier was created between the two properties to prevent oil migration from one to the other.

Dominguez field brines, at a 12,000-bbl. daily rate, are being injected through 17 injection wells in an irregular five-spot pattern. Four of these are along the common boundary. More than 7,500,000 bbl. of water has been injected since the flood was started in July 1954.

Oil is being produced through 19 wells. Their current output is about 2,800 bbl. daily. The average per-well production has climbed from 22 bbl. daily at the start to approximately 150 bbl. daily. A few wells reportedly are producing at rates in excess of 500 bbl. daily.

Neither Shell nor Union, the operator, will discuss results of the flood. However, available figures on the entire east central fault block, in which the flood is located, give a good indication of its performance (see chart).

These show that the produced gas-oil ratio has declined from about 1,100 to less than 400 cu. ft. per barrel. Water production has increased from about 3,500 bbl. to 5,500 bbl. daily.

As shown in the chart, production continues to increase from month to month. Peak production, according to reports, is expected to be around 3,500 bbl. daily. The crest may be reached late this year.

Gulf Enters Bison Basin

LANDER, Wyo.—Gulf Oil Corp. has agreed to pay $775,000 to Elmer J. Boeseke, Jr., Lander and Los Angeles oil man, for half of his interests in Wyoming Bison Basin oil field.

The deal involved $400,000 in cash and $375,000 in oil royalty payments. Gulf took over operation of the southern Fremont County field and agreed to drill at least two deep tests.

Gulf acquired more than 13,000 acres of leases and 10 wells producing from the shallow Frontier formation. The firm is chiefly interested in testing deeper zones, Boeseke said.

Industry BRIEFS

AUSTIN. — Operators in Quinduno field, Roberts County, Texas, have been notified by the Texas Railroad Commission to appear before it August 1 to show cause why their wells shouldn't be shut in for excessive gas flaring. Quinduno has more than 140 wells with allowables totaling more than 8,000 bbl. daily.

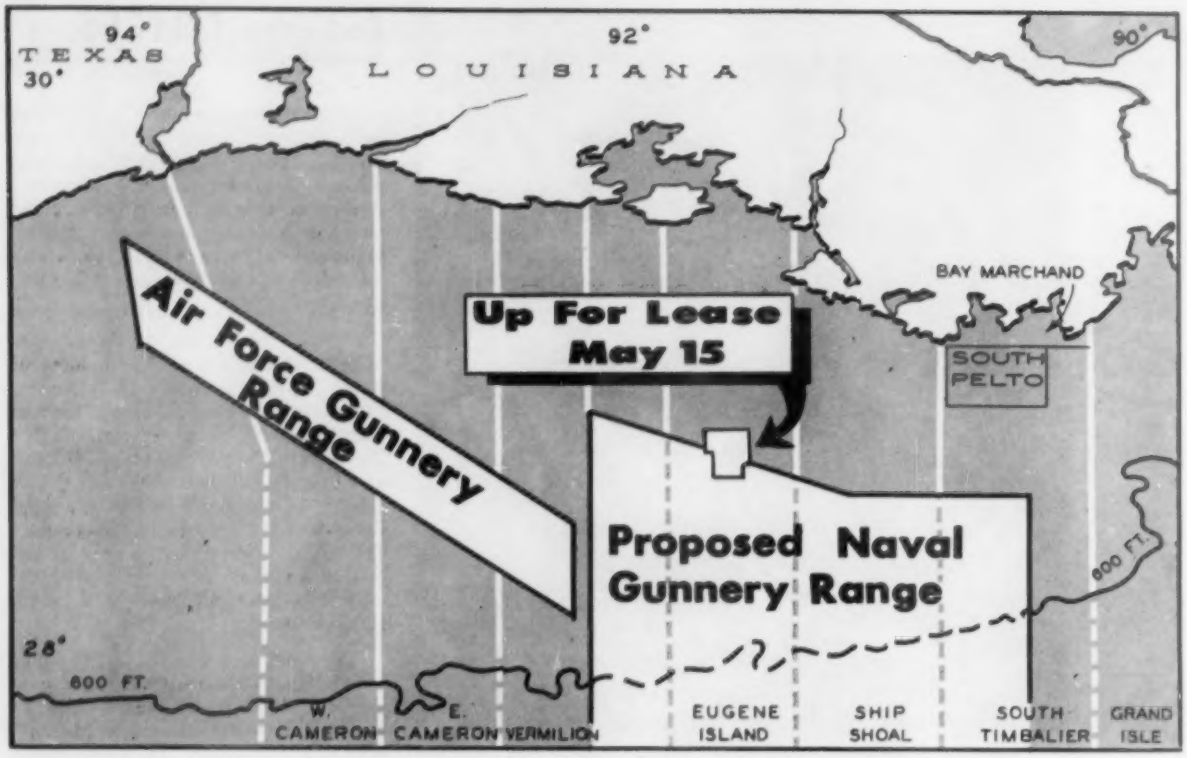
LOS ANGELES. — Stockholders of Great Basins Petroleum Co., Denver, have approved acquisition of Lincoln Petroleum Co., Los Angeles; Brown Well Service of West Texas, Odessa; and Lincoln Oil, Gas & Refining Co., Denver. Total assets of the combined companies are appraised at more than $10 million. Producing properties are located in nine states with 400,000 acres of unexplored leases in 12 states and Canada.

FINDLAY, Ohio.—Ohio Oil Co. is preparing to increase the capacity of its crude oil trunk line between Martinsville, Ill., and Lima, Ohio, by 20,000 bbl. daily.

DENVER. — Colorado Oil & Gas Corp. has acquired the oil and gas properties of North American Car Corp. The deal will boost Colorado's oil production by more than 400 bbl. daily. Properties involved are located principally in Barton, Ellis, Ellsworth, and Russell counties of Kansas. Also included are 13,500 acres of unproved prospects in the Mid-Continent area.

WASHINGTON. — A $42,308,000 expansion of Transcontinental Gas Pipe Line Corp.'s system in nine southern and eastern states has been laid before the Federal Power Commission for approval. The company plans to build 277 miles of pipeline and add 12,750 hp. at compressor stations to provide an increase of 104,500,000 cu. ft. daily in capacity. Given approval, Transcontinental will start the project July 1 and by next December 1 will have all the work except 25 miles of pipeline finished. The remaining line will be laid next year.

WICHITA, Kans.—Sierra Petroleum Co., Inc., is the new name for the former Trans-Era Petroleum, Inc. President Robert F. White says Sierra will operate seven rotary rigs in Kansas and the Denver-Julesburg basin. They will work partially on a contract basis and partially on the company's own exploratory program.



Navy Cancels Threat to Oil Operations

WASHINGTON.—The Defense Department has canceled its plans for a naval air gunnery range which would cut off some of the most promising oil prospects in the Gulf of Mexico.

The disclosure came as the Department of Interior prepared to accept bids May 15 on 152 acres of submerged lands in the disputed area off the coast of Louisiana.

As originally proposed, the target area would overlap some 30,000 acres of this land and black out oil activity on several expensive blocks already leased for exploration (See map).

In answer to the Department of Interior's heated priority claims to the area, the Defense recalled its original proposal for withdrawals on the Continental Shelf and announced it will locate its gunnery range outside the area marked for oil leases.

New policy indicated . . . The Defense Department shifted some airspace warning areas away from oil activity recently, and developments indicate that it will cooperate on a broader scale in efforts to meet Interior's objections to the withdrawal of potential oil lands elsewhere.

Such a shift in policy would also quiet congressional fears—and petroleum industry suspicions—that the Defense Department might later convert its holdings into Naval oil reserves. This issue has been a point of sore contention on the West Coast recently.

The latest interagency squabble centered in the same general area where spirited bidding brought the Interior Department more than $106 million last year, despite the fact that title to the land was—and still is—clouded by contradictory state and federal claims *(The Oil and Gas Journal, July 18, 1955, page 62)*.

The leases attracted high bids averaging about $395 an acre. The same high interest is expected to accompany bidding on leases being offered in the new area.

The effects . . . But if the Defense Department had followed through on original plans for the Navy gunnery range, oil activity would have been greatly limited.

Expansion on the western end of the coastal section is already blocked by the recently enlarged Air Force gunnery range used by Air Force pilots from Lake Charles and Alexandria bases. The range is about 20 miles wide and 130 miles long.

Exploration to the south and east is limited by deep water—and that just about takes care of the oil potential in that offshore section.

This set of circumstances had oil men wondering why the Navy chose relatively shallow water for its gunnery practice when there's plenty of deep water 100 miles east and about the same distance to the south. Neither area would be near shipping or oil operations.

Pentagon spokesmen countered that fuel supply of fighter planes greatly limits the distance pilots can fly to and from a gunnery range and still get in their practice shots.

But this didn't make oil men forget that the proposed range would have the effect of "fencing in" some of the richest offshore oil production yet developed and prevent exploration for more reserves there.

The northern boundary of the proposed Navy range would have passed within a few hundred feet of a 5,000-acre block which cost the CATC Group of offshore oil operators more than $9 million in bonuses last summer.

The boundary would actually have cut across a 2,500-acre lease for which Phillips Petroleum Co. paid $600 an acre. Other companies holding leases

in the area are The Texas Co., Stanolind Oil & Gas Co., and Placid Oil Co. All are in Eugene Island area.

Washington stir . . . A stir was caused in Washington several months ago when Wesley A. D'Ewart, assistant secretary of interior, was quoted as saying the Navy had proposed setting aside a petroleum reserve in the Gulf of Mexico.

D'Ewart later clarified the statement by saying the Navy was seeking a new gunnery range. Some industry skeptics aren't sure he didn't put his finger on the situation the first time.

Both the Department of Defense and the Interior Department based priority claims on the defensive needs of the nation. But they had trouble agreeing on which is more important to the national security—gunnery ranges or oil reserves.

Ohio Leasing Big

Kewanee bids for 500,000 acres in southern section

COLUMBUS, Ohio. — Perhaps the biggest land play that Ohio has ever seen is being taken by Kewanee Oil Co. in rank wildcat territory covering several southern counties.

The company has already leased well over 100,000 acres in Fayette, Ross, Pike, Scioto, Adams, Madison, Clinton, and Pickaway counties. And it is shooting for more than 500,000 acres. That would amount to about 2 per cent of the state's entire land area.

Kewanee is paying a flat 10 cents an acre and 10 cents per acre annual rental on all leases. Twenty-five land men and attorneys are busy contacting the more than 1,000 landowners in the area, which has been virtually untouched by the drill for half a century.

The play lies generally south of Columbus. It is parallel and to the west of the north-south Clinton-Silurian trend. Clinton discoveries accounted for 90 per cent of the new oil found in Ohio last year *(The Oil and Gas Journal, April 9, page 1966)*. Kewanee believes the geology may be comparable to the Findlay-Lima trend in northwestern Ohio which produces from Trenton sands.

Some surface geology has been mapped. Gravity work is planned after leasing progresses further. Then seismic exploration and strat-hole drilling may follow. Any wildcat program will hinge on the outcome of this preliminary exploration.

Hardly any wildcatting is being done in Ohio. Only four tests have been drilled this year and there were only 27 during all of 1955 out of more than 1,200 wells put down in the state.

watching WASHINGTON

. . . with Bertram F. Linz

Navy can't drill on San Nicolas . . .

THE House last week refused to give the Navy money to test San Nicolas Island as a possible naval petroleum reserve.

The $529,000 denied, however, is far less important than the basic principle involved. The Navy claims it has authority to drill for oil on any land granted it for any purpose. But a number of congressmen assert that the designation of an area as a reserve must precede any test or development.

The appropriations committee agreed with the latter view. It said it found "no authority or justification" for the San Nicolas venture.

Gulf and West Coast congressmen see San Nicolas as something more than a small island off California. They see it as a possible step toward a broad search for oil by the Navy. It could be the means by which the department could drill on thousands of acres it controls in oil states. Even more important, it could clear the way for reservation of a big segment of the outer Continental Shelf at some future time.

The Defense Department is trying to get some 35,000,000 acres of shelf lands set aside for military purposes. Navy officials say they have no plans for making any of it an oil reserve. But management, in both government and business, changes from time to time, and so do policies.

Gas cases keep piling up on FPC . . .

THE Federal Power Commission is making slow headway cleaning up the backlog of rate and certificate filings of independent producers.

It is whittling down the backlog of certificate filings. But it is hardly keeping up with incoming applicatons for rate changes.

The FPC receved 118 certificate applications last month and disposed of 261, cutting its pending cases from 3,908 to 3,765.

But it acted on only 62 rate changes and added 5 cases to the 191 pending at the beginning of the month. A total of nearly $18,400,000 a year is involved in the suspended applications on which the commission has yet to act.

In the 23 months since the Supreme Court decision in the Phillips case the FTC has received more than 21,600 certificates and rate filings. There have been 6,848 certificate applications. Rate filings totaled 14,789, of which 288 were received in April. Most of these, of course, have been the original filings called for after the Supreme Court action.

More stringent pollution control ahead . . .

A NEW and tougher water-pollution control program is in the making in Congress.

If adopted, it means that refiners, manufacturers, and other businesses will have to pour hundreds of millions of dollars a year into clean-up projects. The aim is to have factory waste as it leaves the plant as potable as the water of the stream into which it is discharged.

The job of controlling industrial pollution will be at least as great as that of abating municipal pollution, according to the Public Health Service. And it may be even more difficult, for some industrial wastes are hard to handle.

No estimate has been made of what the work will cost. But there are indicators. One is the $25 to $40 million a year spent by the chemical industry, without any great pressure. And that money hasn't accomplished too much.

Shell Goes to Meters

Company sidesteps measuring tanks in planning its new automatic custody transfer systems in Brea Canyon area

LOS ANGELES.—Shell Oil Co. is installing two automatic custody transfer system using positive displacement meters instead of measuring tanks.

The novel installations will be made at Shell's Brea Canyon properties east of Los Angeles. Company officials said the decision to use positive displacement meters was based on potential savings in tankage requirements and labor. Most automatic custody transfer systems now in use employ measuring tanks for determining volume.

One system is scheduled to go into operation this month on a gravity line. The other will be installed on a pressure line later. In both cases, fee production is shipped through a Shell-owned pipeline to a Shell-owned refinery.

The systems . . . Details on the new systems were given last week by Shell engineers B. C. Carlson and T. R. Schmidt. They addressed the West Coast district spring meeting of the A.P.I. Division of Production.

Both systems will use temperature-compensated, rotary-vane type meters. The meters will have a ticket printer, recording thermometer, capacitance-type cut recorder, automatic sampler and electric motor operated valve.

Since both installations will ship through pipelines common to other tank batteries, the automatic shipping cycles will be controlled by time locks. The cycle timer will open the automatic valve once per day at a set time. Flow through the meter will be registered on a resetable counter. At the end of a run, the total volume (corrected to 60° F.) shipped will be printed on a run ticket. Sediments will be removed by a strainer, and trapped vapors bled off by a gas eliminator. Samples will be automatically taken in proportion to metered volume.

Temperature and per cent of water will be recorded on strip charts which are driven by switch closures from the meter. Production will continue to flow into the shipping tank during the shipping circle. An automatic tank bleeding device will continually recycle the tank bottoms through the wash tank. The automatic valve will be closed by a signal from a low-level float switch.

Operation plans . . . When the system goes into operation, warning lights will indicate trouble, including:

. . . High cut—automatic valve will then close when the volume of water exceeds 3 per cent.

. . . Valve failure, sampler malfunction or high tank level—the automatic valve will open if the fluid level reaches the high float-level switch.

The systems will operate automatically following a 1-month calibration period. The gager will visit the location once a week to collect the run ticket and the sample and read the temperature chart. In case of a malfunction, a red light located atop the control panel, and visible for several hundred feet, will attract personnel who are in the area daily.

Automatic trap farms . . . Shell has built up considerable experience with automatic trap farms.

Shell has three automatic trap farms handling production from 80 wells in the same Brea Canyon field. Each farm has essentially the same components. They have been in operation for two years. Production from the individual wells is periodically diverted from the bulk line through metering facilities by air cylinder operated plug valves.

These metering facilities include a positive displacement oil meter, a positive displacement gas meter and a capacitance-type cut recorder. Electric switch closures representing tenths of a barrel and tenths of an M.c.f. are sent from the metering elements to the control panel. There they are accumulated on printer counters.

Shell plans to install automatic equipment, with modifications, on five additional trap farms at Brea. These include a telemeter system to the field office instead of printing production rates at the farm. Integrating cut recorders will also be used to report clean oil in a well's production.

The field office teletype printer will record well identification, date, time, gross fluid, clean oil and gas production. Shell expects to have well-test information, on about 200 wells at 8 farms, automatically recorded in the field office by the end of the year.

Ventura facilities . . . At Ventura, Shell has an automatic trap farm. But due to component difficulties, it is manually operated at the present time. The company expects to solve these problems and put the system on full automatic soon.

This unusual system is on a volume basis. The production time of 50 bbl. of fluid is measured. From this the daily rate is computed. Data from each well test are generated by various metering instruments, including test duration, gas production and water percentage.

The information is then converted to digital values and stored in electromechanical registers. After each test, the stored data are transmitted from the field registers over a two wire communication line to a central station. The field registers are then reset for the next well test.

At the central station, the test information is processed by a bridge-type computer and the results typed out by an electric typewriter. The information typed includes date, well identification, test duration, gross production in barrels per day, M.c.f. of gas per day, per cent water and gas-fluid ratio.

Air cylinder operated plug valves are used for well switching. High 50-bbl. test tanks are used for fluid volume measurement. The differential pressure-type cut recorder is used for per cent water determination. Gas volume is measured by integrating and pressure-compensated orifice meters. Three orifice runs are employed to obtain the required range.

Troubles . . . This system with its complex data handling equipment has proved a rather advanced undertaking. Difficulty has been experienced in placing it into operation. The differential-type cut recorder is sensitive to density variation. Compensation has to be provided for each well.

The high 50 bbl. tanks with auxiliary motor valves and float switches are a costly means of fluid volume measurement. They were originally installed because of their inherent tolerance for sand and other foreign matter in the crude. It now appears that the dump-type meter may prove more practical.

Gulf Plans Another Reformer

PHILADELPHIA.—Gulf Oil Corp. plans to build another 26,000-bbl. daily Platformer at its refinery here.

The Platformer will be built in conjunction with another Platformer announced last month as part of a $35-million moderation program at the refinery. Both units are scheduled to be completed late next year. They will give the refinery a 37 per cent ratio of cat reforming to crude capacity. The refinery already has a 16,000-bbl. Platformer on stream.

The new reformers will enable Gulf to catalytically process essentially all refinery gasoline components here.

The two new units are licensed by Universal Oil Products Co. and will be constructed by Procon, Inc.

Lion Reopens Plant

But two other refineries still closed by strikes

A PARTIAL resumption of operations at the El Dorado, Ark., refinery of the Lion Oil Co. was the only bright spot last week among three domestic refineries shut down because of labor disputes. The refineries have a total capacity of 132,500 bbl. daily.

Supervisory employes are being used to operate the 27,500-bbl. daily Lion refinery. The plant was shut down in early March following a wage disagreement with an A.F.L. affiliated union.

No progress was reported in negotiations between the management of the Cities Service Oil Co. (Del.) and a local labor union at the 55,000-bbl. East Chicago refinery of the company. The refinery was shut down April 3. One local union refused to accept a wage increase which was approved by other unions at the refinery and in the area. The union is insisting on plant-wide seniority rights.

Immediately after the refinery shut down, the Cities Service Co. reduced its crude purchases in Kansas, Oklahoma, Texas, New Mexico, and Louisiana to 60 per cent of normal. But on May 1 purchases were increased to 80 per cent when the company was able to find additional markets with other companies.

The new 50,000-bbl. refinery of the Shell Oil Co. at Anacortes, Wash., was shut down last month shortly after it started operating with Western Canadian crude oil. There is no change in its status. The dispute there involves wage rates. The CIO union insists that prevailing wages are under those paid in other parts of the country in refinery operations. Management and the unions have agreed upon a mediator.

Sunray Tests FPC Ruling

WASHINGTON. — Another major issue in natural-gas regulation is headed toward a thorough airing in the courts.

The right of an independent producer to halt deliveries to a purchaser upon termination of his contract is involved in a suit filed by Sunray Mid-Continent Oil Co. in the Tenth Circuit Court of Appeals.

The company asked the Federal Power Commission for certificates covering sales of gas to the United Gas Pipe Line Co. over the period covered by its contracts. Last January the FPC refused to put a time limit on deliveries.

The certificates issued by the FPC would tie Sunray to United for the life of their contracts and so long thereafter as the commission sees fit.

Sunray challenges the commission's ruling that service may be stopped only after a hearing under section 7(b) of the Natural Gas Act. It contends that under section 7(e) the FPC must issue certificates as "specifically proposed" by applicants.

FPC Challenged

Gulf asks Supreme Court to review Order No. 174

WASHINGTON. — A second case challenging the legality of the Federal Power Commission's "174" order has reached the U. S. Supreme Court.

A petition for review of a Circuit Court decision upholding the FPC was filed with the court by Gulf Oil Corp. The first case was filed in March by the Union Producing Co.

Both companies contend the order, requiring independent producers to file their prices and secure certificates for sales, was issued without prior notice or hearing and in violation of the administrative procedures law.

Gulf also questioned the FPC's right to freeze prices as of June 7, 1954, without hearings and to hold contract price adjustment clauses to be changes in rates subject to its review.

The company did not contest the Phillips decision. But it asserted that if producers' sales are to be regulated under the Natural Gas Act it should be done in an orderly manner "and within the bounds of the commission's jurisdiction defined in that case and other cases."

The Union Producing case involves another issue. The company contends that Order No. 174 should be nullified because it covers wellhead sales. Such sales are not wholesale sales or sales in interstate commerce and are exempt from regulation, the company contended.

Clark to Expand Refinery

MILWAUKEE.—Clark Oil & Refining Corp. has announced a $5 million, 2-year expansion program for its Chicago refinery.

New facilities when completed will increase output of the Chicago plant from 21,000 bbl. daily to 30,000 bbl. As a first step in the program, Clark has purchased 70 acres of land adjoining the plant and will complete 19 new storage tanks this summer.

New equipment planned includes a second catalytic cracking unit of 15,000-bbl. daily capacity, gas recovery unit, alkylation unit, vacuum unit, a 15,000 cu. ft. vapor sphere and a crude heater.

Refining BRIEFS

EL DORADO, Kans.—El Dorado Refining Co. has doubled oxidized asphalt capacity at its refinery here, from 300 to 600 bbl. a day. A 2,500-bbl. Platformer under construction is now 90 per cent complete.

SHEBOYGAN, Wis. — Empire Petroleum Co. will complete work May 15 on a new vacuum unit at its refinery here. The new facility will add 3,000 bbl. daily to the plant's capacity, boosting it from 5,000 to 8,000 bbl.

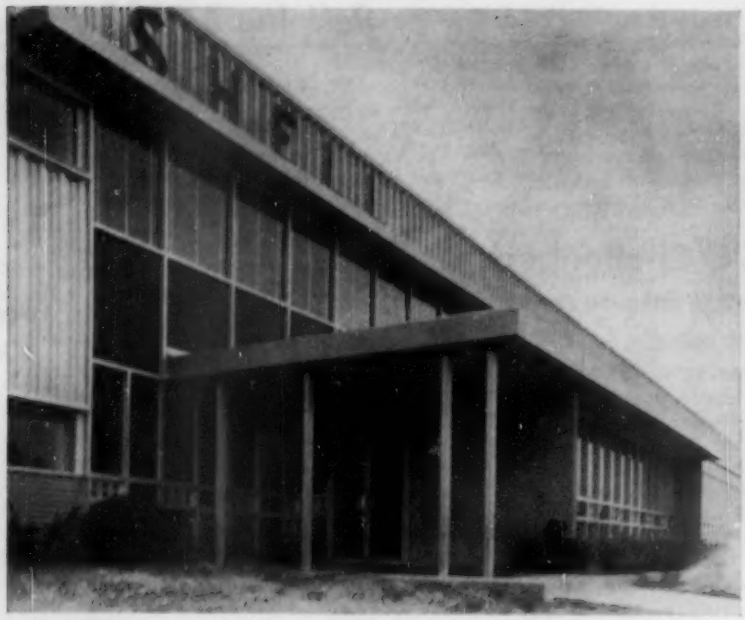
FORT WORTH.—An explosion and fire in the main pump house of Premier Oil Refining Co.'s 7,500-bbl. refinery here knocked the plant out of commission last week. The shutdown is expected to last several days. Plant officials were unable as yet to estimate damage or to fix cause of the explosion. One employe, A. B. Bramblett, Fort Worth, was killed and another overcome by smoke.

BAYTOWN, Tex. — Expansion of Humble Oil & Refining Co.'s butadiene plant here is scheduled to start early in June. The expansion program, to be completed early next year, will boost capacity from 49,000 to 65,000 short tons a year.

PHILADELPHIA. — The International Congress on Catalysis, scheduled to meet here September 10-14, will hear a number of highly technical papers of interest to petroleum. Papers and symposiums have been scheduled for hydrogenation and hydrogen exchange reactions, physical properties of solid catalysts, catalytic cracking and cracking catalysts, and isomerization of hydrocarbons. Of the 81 papers, 41 will come from the United States, the remainder from Europe, Asia, and Africa. Executive secretary of the Congress is Dr. H. Heinemann, P. O. Box 7686, Philadelphia 1, Pa.

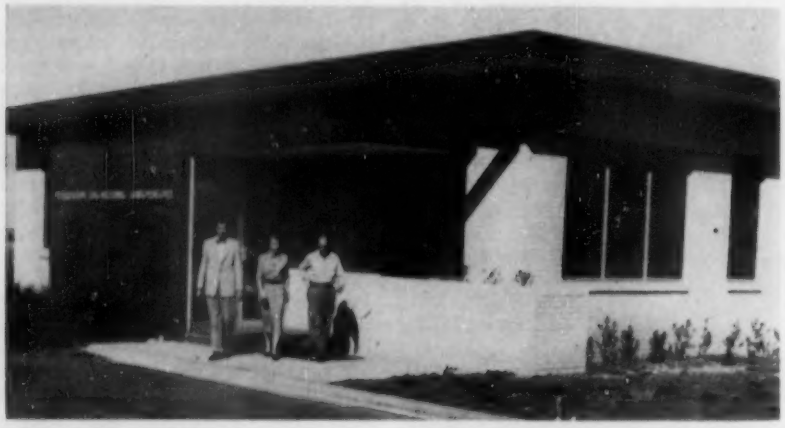
BATON ROUGE.—Foster Grant Co., Inc. has doubled its production of styrene monomer on the second anniversary of the new petrochemical plant here. The $1,665,000 project is matched by a 50 per cent increase in polystyrene capacity at the company's Leominster, Mass., plant.

CHICAGO.—Standard Oil Co. (Ind.) has made a "substantial" increase in premium octane numbers, boosting ratings to a new record high for the company. The new grade, says President Frank O. Prior, will meet all the requirements of the modern cars on the road.



NEW HOUSTON LABORATORY signals expansion of research for Shell Oil Co. and Shell Development Co. The lab is the largest of several springing up across the nation as the petroleum industry gears to meet growing problems.

JOHN W. BRICE, Carter Oil Co. president, breaks ground. Watching are Dr. P. S. Williams, left, chief of research, and Leon B. Senter, architect.



SPECIALIZED RESEARCH is scheduled for Magnolia Petroleum Co.'s new Dallas laboratory. Work will deal solely with core testing and fluid behavior analyses.

Research Labs Mushrooming

THE petroluem industry is gearing fast to meet some of its most pressing problems—better ways to find more oil and improved methods of producing and processing it once it's found.

As the problems grow, so do the facilities for solving them. Research laboratories are popping up like mushrooms in the spring.

In the Southwest, two important ones were completed recently and ground was broken for a third. Construction is also under way on new facilities at Esso Research & Engineering Co.'s research center at New York.

Ohio Oil Co. has plans for constructing a new research laboratory for its Robinson, Ill., refinery. Only information released at this time: it will be equipped with the most advanced testing and analytical facilities.

Biggest of the lot is a two-story structure, which adds 94,000 sq. ft. to the Shell research center in Houston. It will be used by Shell Oil Co. and Shell Development Co.

A hint of what may be one of the major projects there was dropped in this joint statement by the two firms:

"It is hoped that a method can be devised so that wells can be completed on the floor of the ocean with no derrick, platform, pipe, or other obstruction in the way of passing ships."

Shell has plans for boosting the size of its exploration and production research division staff from 360 to 500 by the end of the year. It's indicative that Shell had only 60 staff members in this division late in 1945.

The other completed laboratory is located at Magnolia Petroleum Co.'s field reserch center 15 miles south of downtown Dallas. The structure adds 4,000 sq. ft. of floor space and 2,000 sq. ft. of storage area. Work there will be highly specialized—dealing solely with core testing and fluid behavior analyses.

Carter Oil Co. held ground-breaking ceremonies this month for an addition to its Tulsa research laboratory. The move will increase floor area from 70,000 sq. ft. to 100,000 sq. ft. Shop space will be boosted by 3,000 sq. ft.

Carter's research staff at Tulsa now numbers 268. The new addition will provide working space for about 100 additional staff members. The project is scheduled for completion in mid-1957.

Esso's new laboratory should be ready for occupany by next January. A five-story office building also is going up at the Esso research center site.

Labor Wins Court Tests

Firm must open books to show it can't meet wage demands; another ordered to negotiate terms of employe-stock plan

WASHINGTON.—Employers claiming financial inability to give pay raises demanded by their workers may have to open their books to the unions to prove their point.

The Supreme Court last week held that an employer committed an unfair labor practice by refusing to show his financial records in such a situation.

It reversed a lower court decision overruling a National Labor Relations Board finding that a claim of financial inability to grant a wage increase must be supported by figures.

The high court's opinion, however, left the issue high in the air. It did not hold that in every case in which economic inability is raised as an argument against increased wages, it follows that the employes are entitled to substantiating evidence, Justice Black pointed out.

"Each case must turn upon its particular facts," the court said. "The inquiry must always be whether or not under the circumstances of the particular case the statutory obligation to bargain in good faith has been met."

The issue of union access to company records has frequently been a sore point in labor disputes. The unions have claimed that some companies offered arguments which would not be supported by their records. The companies argue that the unions are not entitled to see confidential data.

Richfield case . . . In another decision the Supreme Court recently ordered Richfield Oil Corp. to bargain with the Oil, Chemical and Atomic Workers International Union on terms of a stock purchase plan for Richfield employes.

The court denied Richfield's request for a review of a decision by the District of Columbia Court of Appeals ordering Richfield to bargain with the union on the plan *(The Oil and Gas Journal, January 23, page 54)*.

Richfield had carried the case to the Circuit Court and then to the tribunal after the National Labor Relations Board held the stock purchase program was, in effect, a form of compensation and thus subject to collective bargaining.

The dispute broke out nearly three years ago when Richfield announced to its employes in Long Beach that it was instituting the plan.

The workers, members of O.C.A.W. Local 1-128, notified the company it wished to negotiate on some aspects of the plan. The company refused, contending terms of the program were not subject to collective bargaining.

Road Crossings Become Big Issue in Texas

HOUSTON. — Open warfare broke out last week over the right to lay pipelines under Harris County roads.

The county filed suit against Magnolia Pipe Line Co. in a renewed effort to enforce its claim that pipelines cannot legally cross county roads without a permit.

While the suit was pending, County Commissioner V. V. Ramsey ordered his workmen to remove a section of pipe from one of the crossings involved in the dispute.

"I dug down 4 ft. on each side of the road and had one of my men cut the pipe with a torch and pull the pipe out," Ramsey said.

A company spokesman said Magnolia had not been served officially with a citation. "It is the company's stand that the law does not require pipeline companies to obtain county permission to cross roads," he said.

The county is seeking $2,500 damages plus an injunction halting further work on three crossings. County Attorney Burke Holman said the sheriff's department has been instructed to arrest workers if they attempt to complete the projects while the suit is pending.

District Judge Dan W. Jackson set a hearing in the case for May 18.

Holman claims Magnolia laid pipeline casings under three county roads before notifying the county of its plans.

County officials contend that a 1947 road law gives commissioners court the right to restrict pipeline crossings of county roads and to assess a fee for each project.

The county lost a similar case against Tennessee Gas Transmission Co. several months ago *(The Oil and Gas Journal, January 9, page 70)*.

Rumored Deals Denied

NEW YORK.—Sinclair Oil Corp. issued a formal denial last week to rumors it has offered to buy Southern Production Co. or has been negotiating for Texas Pacific Coal & Oil Co.

The Sinclair statement conceded the company is "always interested in acquiring crude oil and gas production reserves." But it said flatly that "no offers of any kind have been made for the properties of any producing company with which Sinclair's name is currently being linked by rumors."

The Sinclair statement did not name either Southern Production or Texas Pacific Coal & Oil, but rumors here have linked the two in deals.

Line Wins Approval

American Louisiana given permit, expansion order

WASHINGTON.—American Louisiana Pipe Line Co. of Detroit has received authorization from the Federal Power Commission to operate its Louisiana-to-Michigan line now nearing completion.

The FPC also authorized American Louisiana to build a 117-mile, 22-in. line from Payne, Ohio, to Bridgman, Mich., to connect its main line with the Michican Wisconsin Pipe Line Co. system. Estimated cost of the connection is $7,820,000.

Under the FPC order, the entire 300 million cubic feet daily initial delivery capacity of the American Louisiana line is allocated to two of its affiliates.

Michigan Consolidated Gas Co. will get 200 million cubic feet of gas daily. Michigan Wisconsin will get 100 million cubic feet daily. Both, along with American Louisiana, are subsidiaries of the American Natural Gas Co.

Of the capacity, only 135 million cubic feet of gas for Michigan Consolidated was made on a permanent basis, and 85 million cubic feet was allocated permanently to Michigan Wisconsin.

Michigan Wisconsin in a separate action received FPC authorization to expand its system. About 252 miles of pipeline and 3,400 additional compressor horsepower are planned at a cost of $11,435,000.

Out-of-Court Deal Made

HOUSTON.—An out-of-court settlement was announced last week in a railroad dispute which had threatened to delay development of a multimillion-dollar petrochemical center here.

Southern Pacific Lines dropped its injunction suit against other railroads seeking to serve the 950-acre site recently acquired by Phillips Petroleum Co. Phillips previously had been dismissed as a defendant in the suit *(The Oil and Gas Journal, April 23, page 90)*.

Imports, Exports Drop Again

BOTH imports and exports decreased again in February, according to the regular monthly tabulation by the Census Bureau of the Department of Commerce. Compared with last year, imports were up slightly and exports dropped sharply.

Here are some of the important changes for the month:

. . . **Crude imports from Canada** averaged 112,700 bbl. daily for a new record. In the past 12 month, 10 new records have been set by imports of Canadian crude.

. . . **Saudi Arabia** supplied 98,900 bbl. daily in February, the highest since June 1954.

. . . **Crude from Venezuela** averaged 423,900 bbl. daily, up from January but below the all-time record established in December.

. . . **Middle East crude** averaged 258,000 bbl. daily for increases of 16.0 per cent over January and 4.9 per cent over February 1955.

. . . **Latin American** crude averaged 460,000 bbl. daily, up 3.1 per cent over January and 2.8 per cent over same month last year.

IMPORTS INTO CONTINENTAL U. S.
(Thousands of barrels)

	Feb. 1956	Jan. 1956	Feb. 1955
Crude—			
Mexico	340	515	761
Colombia	610	885	568
Venezuela	12,295	12,361	11,082
Peru	.....	122	120
Ecuador	..	64	.....
Trinidad	97	.....	.....
Kuwait	3,100	3,291	3,927
Saudi Arabia	2,867	1,667	2,276
Neutral Zone	286	419	194
Iraq	437	962	347
Iran	432	326	...
Qatar	358	238	146
Canada	3,269	3,428	569
Far East	482	845	1,100
Total crude	24,573	25,123	21,090
Daily average	847	810	753
Products—			
Residual fuel	15,745	18,270	16,367
Other products	1,187	1,366	1,923
Total products	16,932	19,636	18,290
Daily average	584	634	653
Total all oils	41,505	44,759	39,380
Daily average	1,431	1,444	1,406

EXPORTS*

	Feb. 1956	Jan. 1956	Feb. 1955
Crude	501	994	976
Gasoline	1,177	2,217	1,695
Kerosine	53	176	326
Distillate	1,650	1,516	870
Residual	1,269	1,160	3,033
Lube oils	928	1,017	1,100
Other products	1,154	987	907
Total all oils	6,732	8,067	8,907
Daily average	232	260	318

*Excludes shipments to territories.

. . . **Residual fuel imports dropped** 7.9 per cent below the average for January and 7.1 per cent under February 1955. The average for the December, January, and February was up only 2 per cent over a year ago.

. . . **Crude and product exports** averaged 232,100 bbl. daily in February, representing decreases from the previous month and last year of 10.8 per cent and 27 per cent, respectively. Distillate fuel was the only important product showing an export increase over last year. The largest decrease was reported for residual fuel.

Committee Revised

ODM will control work of new foreign supply group

WASHINGTON. — Mobilization Director Arthur S. Flemming moved last week to set up a new government-controlled Foreign Petroleum Supply Committee.

Flemming invited 13 American oil firms to join the committee. He assured them that immunity from antitrust prosecution granted members of the original committee would be continued.

The committee is being set up under a revised voluntary agreement written after Congress criticized the lack of government supervision of the committee's actions. It is in line with the recommendations in a report by Attorney General Brownell. He was ordered to review committee work by a clause in the Defense Production Act last year.

The committee's main work is the collection of statistics on foreign oil operations for use by the Defense Department. Brownell found that, as originally set up, the committee's analyses of foreign production, requirements, refining and storage, and other facilities "raised real antitrust problems."

There was no suggestion in the report, however, that any of the 15 members had taken advantage of their participation. They include five of the principal defendants and six alleged coconspirators, affiliates, or subsidiaries of defendants in the Government's "oil cartel" suit.

The new agreement provides for continuing the collection of statistics. But the committee will be under the chairmanship of a government official. And except in an emergency, it will make no recommendations concerning shortages of oil. Analysis of the data also will be handled by a government staff instead of the committee.

The invitation to join the committee was sent to Arabian American Oil Co., Cal-Tex Oil Products Co., Creole Petroleum Corp., Gulf Oil Corp., Sinclair Oil Corp., Socony Mobil Oil Co., Inc., Getty Oil Co., Standard Oil Co. (Calif.), Standard Oil Co. (N. J.), Standard Vacuum Oil Co., Superior Oil Co., The Texas Co., and Venezuelan Petroleum Co.

Oil Probe Planned

Monopoly investigation is expected to start in 1957

WASHINGTON. — Another congressional investigation of monopoly and antitrust violations in the oil industry is in the planning stage. The probe, however, is not expected to get under way until next year.

The inquiry will be conducted by Sen. Joseph C. O'Mahoney of Wyoming. He is chairman of a judiciary subcommittee which recently made an intensive probe of the automobile industry.

O'Mahoney's next target will be the meat industry. That inquiry is expected to begin shortly. It will be followed by the oil investigation. The packer probe, however, is likely to carry on until close to the adjournment of Congress. It is not likely O'Mahoney will want to start on oil at that time and then break off during the recess.

There has been considerable demand for an investigation of the oil industry this year. Sen. Hubert H. Humphrey of Minnesota in March and Rep. James Roosevelt of California last week introduced resolutions calling for a probe by the Federal Trade Commission of production, transportation, distribution and sale of products.

Oasis Uranium & Oil Sold

NEW YORK.—Cataract Uranium Mining & Exploration Corp., New York, is acquiring the assets of Oasis Uranium & Oil Corp., Fort Worth.

Oasis, headed by R. W. Brown of Fort Worth and Oklahoma City, has 13 producing oil wells and a single gas well. The oil properties have an income of about $130,000 a year, according to J. Roger Wallace, president of Cataract.

Cataract earlier offered to buy the assets of Colorado Gas Co., Denver. Colorado Gas stockholders will be asked to approve the proposal May 25, Theran M. Davis, president, said last week. The company's operations are centered in the Uinta basin of northern Colorado where it holds about 4,000 acres of oil and gas leases.

Offshore Decision Near

California threatens to set up own rules for tidelands operations unless industry "finds its voice" by May 18

LOS ANGELES.—California's prospective offshore operators, mired in doubts on how best to proceed under the state's liberalized leasing law, may have to speak up soon or forever be silent.

The State Lands Commission has warned the industry that it must submit proposed rules for the prospective operation before the commission's May 18 meeting. Otherwise, the state agency threatened, operators will have to live under a code established by its staff.

The new law—once the Shell-Cunningham Act—was passed by the legislature last June and became effective September 7 *(The Oil and Gas Journal, June 13, 1955, page 143, and January 23, 1956, page 40)*. The measure opened about 135 miles of southern California tidelands to exploration, with another 100 miles excluded unless drainage is shown to exist. Other provisions made it mandatory to slant drill from upland sites, and prohibited artificial drilling islands or platforms in some cases. There was little disagreement here.

The conflict . . . But quite another contention has effectively stifled leasing to date.

The state and the industry are at loggerheads on the question of how much data companies must furnish the commission on results of their preliminary core drilling and seismic operations. Here's how the dispute stands:

. . . The state maintains that without the exploratory data, it would be "blind-folded" in protecting its own interests through establishment of fair royalty provisions.

. . . The industry insists to give unlimited information to the state would mean doing costly exploration work without the protection of a lease.

Meanwhile, the state is sitting on bonus bid requests for some 89,000 acres of tidelands.

The commission's role . . . Under terms of the new law, the commission was granted both "specific" and "discretionary" powers of administration. Under the "discretionary" category, the oil industry was invited to join in setting up ground rules for operation. The industry was to offer its suggestions through the Western Oil and Gas Association.

The commission made it clear, however, that it felt no compulsion to so welcome industry proposals. As one staff member put it, "We are just trying to avoid being capricious, arbitrary, and dogmatic. We'll listen to everyone."

But the association's offshore operations committee seems nowhere near a solution acceptable to the commission. The committee's immediate aim is smoothing internal disagreements which still plague the interested companies.

The bigger threat . . . At its last meeting in Sacramento April 12, the state agency was ready to award the first lease under the new law. But the association's committee asked the state to hold off, "pending further study of the law." That's when the May 18 ultimatum came.

One member of the state legislature went a bit further. Assemblyman Allen Miller threatened to "put the state in the oil exploration business" unless the companies agree to furnish the seismic and core-drilling data.

Another dispute between industry and state involves lease provisions on a 500-acre parcel off Summerland, Santa Barbara County. Industry officials feel this lease, which would be the first granted under the new law, would set precedent for all subsequent tidelands leases. Here again the state threatens to award the lease under its own rules unless the industry speaks up soon.

L.P.G. Storage Wells Pay Off

LOS ANGELES.—Underground storage of propane and butane in a small anticlinal structure near its El Segundo refinery is proving quite profitable to Standard Oil Co. of California.

The project also is providing valuable operating flexibility when various units which make or use L.P.G. are off stream. A review of the operations was made here last week at the A.P.I. Division of Production meeting.

In describing the 5-year-old project, E. G. Bemis, Standard senior petroleum engineer, declared recoveries of 55 per cent or more have been obtained on each injection-withdrawal cycle.

The project is being carried on in two water sands encountered in the small El Segundo gas field. Propane is temporarily stored in a 3,350-ft. sand and butane in a 3,650-ft. reservoir. One butane and two propane wells have been completed.

Both sands have extremely active water drives, Bemis said, permitting wells to be flowed at rates up to 1,000 bbl. daily. The propane and butane are recovered in a liquid state, ready for sale. Wellhead connections permit remote control from the refinery.

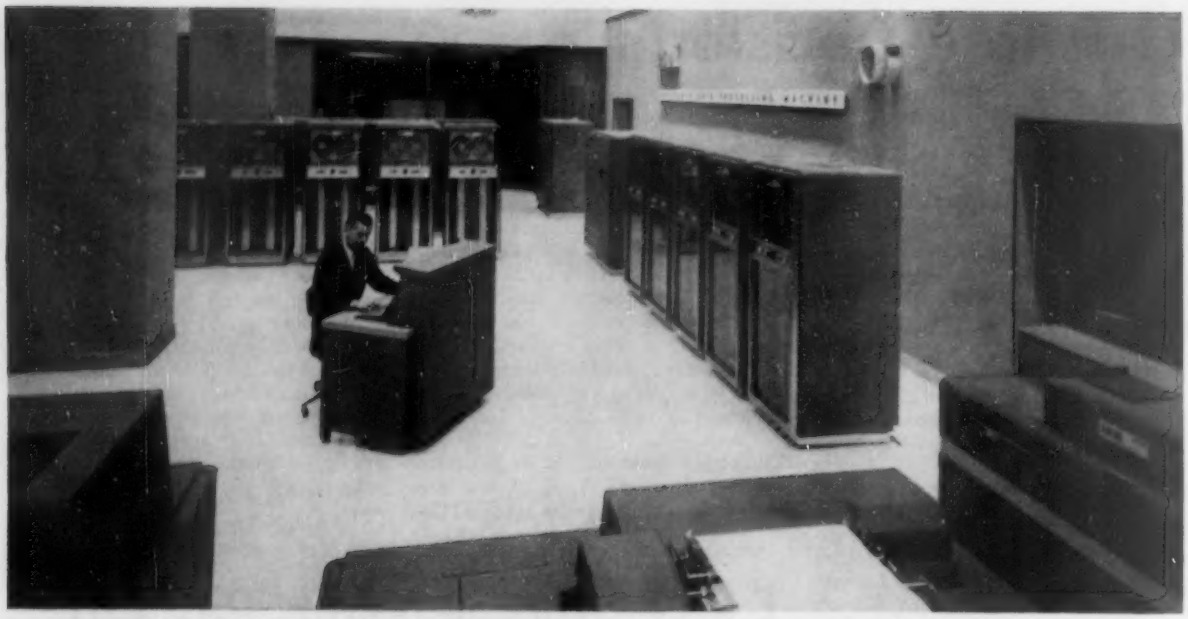
Some gas is produced from the water sands, Bemis said. But it has not contaminated L.P.G. products stored in the sands. At the refinery the products flow through a weathering drum where any entrained water settles out and is drawn off.

The injection and withdrawal performance of the storage wells is summarized in the accompanying table. A 65 per cent recovery of propane was obtained on the third cycle of the well which had been in operation longest. The second well completed in this sand yielded 92 per cent of the propane injected. Sixty-one per cent of the butane injected in the deeper pay was recovered at the end of the first cycle.

PERFORMANCE OF EL SEGUNDO PROJECT BY STORAGE CYCLES

Propane storage—	Date	Volume injected	Volume recovered	Per cent recovered
Standard 21 Gough:				
Injection started	July 1952			
End first cycle	March 1953	78,362	47,508	60
End second cycle	March 1955	200,142	109,552	55
End third cycle	March 1956	141,377	88,443	65
Standard 8 Gough:				
Start injection	Aug. 1955			
End first cycle	March 1956	31,921	29,296	92
Butane storage—				
Standard 22 Gough:				
Start injection	April 1954			
End first cycle*	March 1955	259,853	159,437	61

*Well not depleted.



THIS ARRAY of data-processing equipment has been installed at Baton Rouge plant as . . .

Esso Pioneers Giant Computer System

BATON ROUGE.—Esso Standard Oil Co. is pioneering the use of giant electronic computers in the oil industry.

A king-size IBM 705 electronic data processing machine has been installed in the company's Baton Rouge refinery. It is the first of 10 scheduled for delivery to the oil industry, including one for Esso's Bayway, N. J., refinery.

The new computer is capable of processing commercial, engineering, and scientific problems. Printed reports are produced in a matter of minutes or hours as compared to days, weeks, or even months by former methods.

Esso at present will use the system for payroll preparation, inventory control, purchasing, and accounting for various warehouse materials and supplies. It also will be used for product-sales shipping, billing and analysis, personnel records, general accounting and yield, and cost records and reports.

Its engineering and scientific calculations are still being handled by three IBM 650 magnetic drum data processing machines. Twelve other of these medium-sized computers are in use by oil companies and 45 more are on order.

The 705 succeeds the 702 in International Business Machines Corp.'s line of giant data-processing equipment. Principal innovation in the new machine is the magnetic core memory which replaces the electrostatic memory used in earlier equipment.

The high-speed magnetic core memory contains 20,000 storage positions. Information may be recalled from it in a few millionths of a second. The 705 has additional storage capacity in its conventional magnetic drum memory and on magnetic tape, which also serves as an input-output medium.

New approach . . . But Esso didn't rush into the electronic computer field. It spent 20 months just preparing to install and operate the new system at the refinery here.

As a result of this advance planning, Durwood Robison of the Esso staff estimates the data-processing system should be operating on a routine basis before September.

Robison had this advice for other refiners contemplating installing an "electric brain:"

. . . Lay your organization groundwork carefully.

. . . Prepare for its coming with advance work planning.

Then when you finally reach the electronic computer stage, you'll be able to take the change in stride.

Experience valuable . . . Esso's headaches are sure to be duplicated by other refiners as they take on electronic computers.

For instance, Robison points out, Esso is not expert in the electronic data-processing machine field. In fact, there is little E.D.P.M. experience to draw on, although much has been gained with electronic accounting machines.

Hence, Esso embarked on studies—some years ago—to investigate methods of using a computer, and how it might integrate into the existing system. The result: Essenially all of the planned applications have been tested and proven sound by Esso. The transition to the actual computer is expected to be smooth. At that, Robison notes preparation for E.D.P.M. is still in progress at the refinery.

Basic approaches . . . Three plans can be followed when preparing for E.D.P.M. These include:

. . . Conversion approach. The big effort here is to convert all applications presently mechanized. The strategy is to spend little time developing the system to use E.D.P.M. and concentrate on getting physically lined out to receive the computer. Later the converted system can then be improved more fully to utilize E.D.P.M. capabilities.

. . . Integration approach. The idea here is to have final, well-integrated systems already developed before arrival of the computer. When the unit is installed, its capabilities can be fully utilized at once.

. . . Intermediate approach. This is somewhere between the first two extremes. The company carries on some conversion and some development work

both before and after arrival of the equipment.

Esso chose to use the integration approach. It called for more concentrated effort during the preparation period, but in turn full benefits of E.D.P.M. will be realized much earlier. This will be achieved without duplicating the programming effort later on, Robison says.

Getting ready . . . Plenty of in-plant education is needed to organize and develop master plans and fit them to E.D.P.M. operations.

Esso finds that all departments must be educated to want the program in order to get maximum benefits. These departments, in turn, will be in a better position to supply the knowledge necessary for program development.

So Esso set up a flexible educational schedule. Top management was brought in and exposed to the principles of E.D.P.M. in a 2-hour session. The 72 affected supervisors received a longer, 1-day course to acquaint them with the process. Finally, the 15 method analysts and programmers along with 32 employees from the many refinery departments received an intensified 4-week programming course to teach them the setup.

This latter group will help in method development pertaining to their particular organizations. The 15-man task group of analysts and programmers, meanwhile, have the job of installing the computer and fitting it into the refinery picture. They will set up the coding procedures and various block diagrams and generally shepherd the computer through its early days of operation. When the work load lines out, this group probably will be split in half.

Master plan . . . All record-keeping jobs relating to the plant are worked into a master plan.

Thus, Esso set up as projects to receive E.D.P.M. treatment such categories as pay and personnel, materials and stores, sales and shipping, operations analysis, and fixed assets.

Each of these are broken down into pertinent categories, and the computer will be used to issue reports pertaining to any category desired. Such reports as manpower scheduling, material distribution, order records, operating data, and depreciation calculations will be made under E.D.P.M.

Other reports to be handled include financial and costs and secondary reports. These two are intermediate steps dependent upon data from one or more of the five other projects.

Each project is made up of several E.D.P.M. runs. A major set of instructions will be loaded in the machine and data processed. A single loading and processing represents a run. There are major limitations which will define an E.D.P.M. run, Robison asserts. These are:

. . . **Required sequence** of data.

. . . **Due date** for finished output.

. . . **Internal memory** capacity of the computer for random access.

. . . **Tape rewind** time and frequency.

. . . **Input and output** capacity.

A run has to stay within the limitations imposed and can't overstep these bounds. It has to be broken down into simpler problems to stay with the unit's capacity.

In drawing up the program, run distribution was decided according to projects and manpower requirements determined according to the distribution. Thus, the payroll and personnel project required four daily, one weekly and one semimonthly run. Operations analysis required three daily runs and fixed assets only three monthly runs plus one extra. The man-months required in these three projects totaled 45, 30, and 12, respectively.

Man-hour distribution also was broken down on projects for program development, coding, testing and master tape set-up requirements. With this planning done, Esso was ready to put the computer to work the day it's installed.

Helpful hints . . . Esso picked up valuable experience in its preparations which it shares with other refiners:

. . . **Plan your programs** so there is at least one E.D.P.M. run between planning and program completion.

. . . **In program planning meetings** avoid discussions on "what is to be done" and stress "what has to be done."

. . . **Coordinate program planning** closely to assure continuous development.

. . . **Encourage maximum "packing"** of runs to reduce frequency of file processing.

. . . **Generalized routes** are needed to reduce duplication of effort.

. . . **Use progress reports** and test schedules to direct and pace effort.

. . . **Appoint a construction coordinator** in charge of physical installation of the unit.

Other random tips to prospective E.D.P.M. users:

Set up over-all program time schedule . . . Decide which auxiliary components are needed . . . Prepare a machine-room layout . . . Determine auxiliary electronic accounting machine requirements . . . Have a good program assembly procedure . . . Make test procedures to save test time . . . Establish a run book and emergency file . . . Have an original input data system . . . List minimum tape requirements and compute the use cycle of each . . . Prepare an emergency data processing procedure . . . Have an operating schedule for E.D.P.M. . . . also an organization and operating plan . . . Set up internal control and machine control procedures . . . Have a "keep-integrate" procedure to police changes and prevent system from developing into many disconnected functions.

Esso Experts Chart Master Job Plan for Electronic Computer

ESSO STANDARD OIL CO. has set up seven big projects for the new electronics data-processing machine at its Baton Rouge refinery. For report purposes, these are divided into categories. These are:

Payroll and Personnel
Manpower scheduling
Timekeeping
Payroll administration
Payroll deductions and checks, including annuity and tax reports
Employe benefit plan administration
Service records and seniority
Educational records
Personnel statistics
Medical records
Safety and training records
Labor distribution
Blood bank records
Locker identification records
Retirement income computations.

Materials and Stores
Storehouse issues and receipts
Stock level control
Stock purchase orders
Purchase verification
Payable checks
Material distribution
Analyses and reports.

Sales and Shipping
Order record
Package inventory reports
Shipping schedule
Shipping papers
Bills of lading
Invoices
Sales statistics.

Operations Analysis
Operating data
Inventories
Meter and gage calculations
Laboratory data
Material balances
Miscellaneous statistics
Utilities and chemical distribution.

Fixed Assets
Appropriation control
Construction records and reports
Construction closeouts
Plant records
Retirements and transfers
Plant Ledger
Depreciation calculation
Plant catalog
Annual reports.

Financial and Cost
Cost distribution entries
Code checking and translation
Cost allocation
Voucher register
General ledger
Cost and financial reports and analyses

Secondary Reports
Short and off-sequence reports
Multiproject reports and analyses
Off frequency reports.

Profit Split Offered

Tapline proposes to go commercial, share half of income with four Middle East nations in move to avoid dispute

TRANS-ARABIAN PIPE LINE CO. has taken the initiative in the brewing dispute over royalties by offering to split its profits on a 50-50 basis with four Middle East countries.

The surprising proposal came 2 days after Tapline revealed a $14,000,000 expansion program to increase throughput of its line by 90,000 bbl. daily.

If the governments of Saudi Arabia, Syria, Jordan, and Lebanon accept Tapline's offer, they will receive a total of about $16,000,000 a year. The company now operates only to pay costs. It has volunteered to change to a commercial, profit-making firm.

The package deal possibly could head-off wrangling over demands for increased royalty payments. Lebanon already has approached Tapline for increased revenues. Demands from others are certain to follow. All would be an aftermath of higher pipeline royalties gained by Syria late last year in an agreement with Iraq Petroleum Co., Ltd.

Negotiations between Lebanon and I.P.C., begun after the Syrian agreement, have broken down *(The Oil and Gas Journal, February 13, page 96)*. Approval by the Arabs of Tapline's offer would avoid this type of dispute.

At present, Lebanon, Syria, and Jordan receive $1,250,000 a year from Tapline. Saudi Arabia receives nothing under an agreement which has 8 more years to go.

The expansion . . . Tapline is owned by the four owners of Arabian American Oil Co. (Aramco). The Texas Co., Standard Oil Co. of California, and Standard Oil Co. (N.J.), each holds 30 per cent, and Socony Mobil Oil Co., Inc., owns 10 per cent.

The expansion program will increase maximum throughput of the line to about 410,000 bbl. daily from its present capacity of 320,000 bbl.

Four auxiliary pumping units will be installed in Saudi Arabia and Jordan. They will be located about midway between the main pumping stations at Qaisumah, Rafha, Badanah, and Turaif in Saudi Arabia. The most westerly of the units will be located at Qaryatain in Jordan.

The pumping units will be unattended. Operation will be controlled by radio from the main station. A fifth unit will be added to existing facilities at Turaif.

C. A. Swigart, chairman of the board and chief officer of Tapline, said the new pumps are expected to start arriving next February. They are scheduled to be in operation by January 1, 1958.

Tapline's 30-31-in. line extends 753 miles from Hafar al Batin pump station in Saudi Arabia to Sidon, Lebanon, crossing short sections of Jordan and Syria en route. Aramco operates the first 314 miles of line from Abqaiq tank farm near the Persian Gulf to Hafar al Batin. Total length of the line is 1,067 miles. It went into operation late in 1950.

England to Get Big Refinery

Regent Oil Co., a major marketer in Great Britain, soon will build a 40,000-bbl. refinery somewhere in southern England.

Work on the $51-million plant will begin before the end of 1956. It is expected to go on stream sometime in 1958.

Regent Oil is jointly owned by California Texas Corp. (The Texas Co. and Standard Oil Co. of California) and Trinidad Oil Co., British firm which last month changed its name from Trinidad Leaseholds, Ltd.

Simon Vos, chairman of both Regent and Trinidad, said last week in London that the 40,000-bbl. capacity will be only the initial output of the refinery. It will be expanded to meet market needs.

The new plant will mark Regent's entry into the refining field. It previously has marketed refined products imported from the Middle East and the West Indies.

Two New Refineries Planned for Panama

TWO refineries, costing $30 million each, will be constructed in Colon, Republic of Panama. Work is scheduled to start within 6 months.

Government officials announced last week they were signing contracts with two Panamanian companies for construction and operation of the plants. No details on capacities, crude sources, or ownership of the companies were disclosed.

Ignacio Molino, minister of agriculture and commerce, acted for the Government in the transactions. John M. Shaheen represented Refineria Petroquimica de Panama, S.A., and Samuel D. Antopol signed contracts on behalf of Refineria Panama, S.A.

Trinidad Tests Set

T.N.A. will drill deviated wells in the Gulf of Paria

TRINIDAD NORTHERN AREAS, LTD., plans to expand its offshore work this year by drilling two deviated wells from its platform in the Gulf of Paria.

The wells will be follow-up tests to the discovery made last year. They also will be T.N.A.'s first new offshore wells since the Trinidad Government granted a depletion allowance for offshore production.

T.N.A. has named the area Soldado field. The discovery well, T.N.A. 1 High Seas, has been renamed 1 Soldado.

The project has held the attention of the oil industry since drilling got under way in July 1954 because it is the first probe of waters between Trinidad and Venezuela. The platform is located 7½ miles from the international boundary and 14⅓ miles from Point Fortin Jetty lights.

No. 1 came in as a producer last year, reportedly making 160 bbl. daily. The producing zone was abandoned because of water encroachment and tests were begun on higher zones.

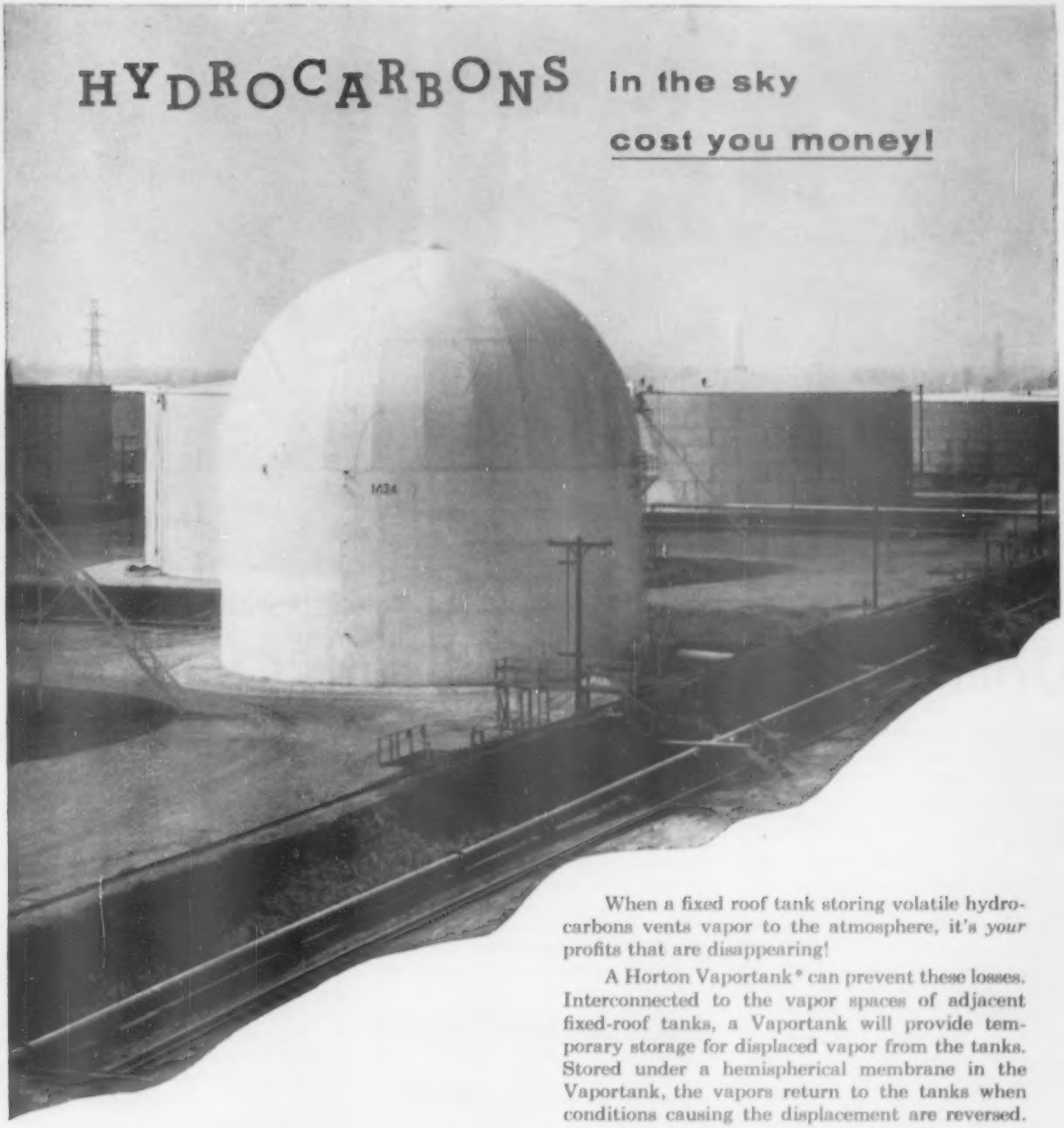
The new wells were scheduled on the basis of encouraging test results. The first of the two will be spudded early in the second half of the year.

The high cost of the offshore well, which was about five times as expensive as a well of the same depth drilled on land, was used as an example by T.N.A. parent companies in pressing their case for a tax concession *(The Oil and Gas Journal, June 20, page 79)*.

The companies are British Petroleum Co., Ltd., United British Oilfields of Trinidad, Ltd., and Trinidad Oil Co., Ltd. (formerly Trinidad Leaseholds).

A depletion allowance was approved recently. But the law is much less liberal than in the United States. Relief on taxable income is provided for on a sliding scale: 10 per cent from 1956-60, 15 per cent from 1961-65, and 20 per cent from 1966-82.

HYDROCARBONS in the sky cost you money!



When a fixed roof tank storing volatile hydrocarbons vents vapor to the atmosphere, it's *your* profits that are disappearing!

A Horton Vaportank* can prevent these losses. Interconnected to the vapor spaces of adjacent fixed-roof tanks, a Vaportank will provide temporary storage for displaced vapor from the tanks. Stored under a hemispherical membrane in the Vaportank, the vapors return to the tanks when conditions causing the displacement are reversed.

Complete details on a Horton Vaportank may be obtained by writing our nearest office.

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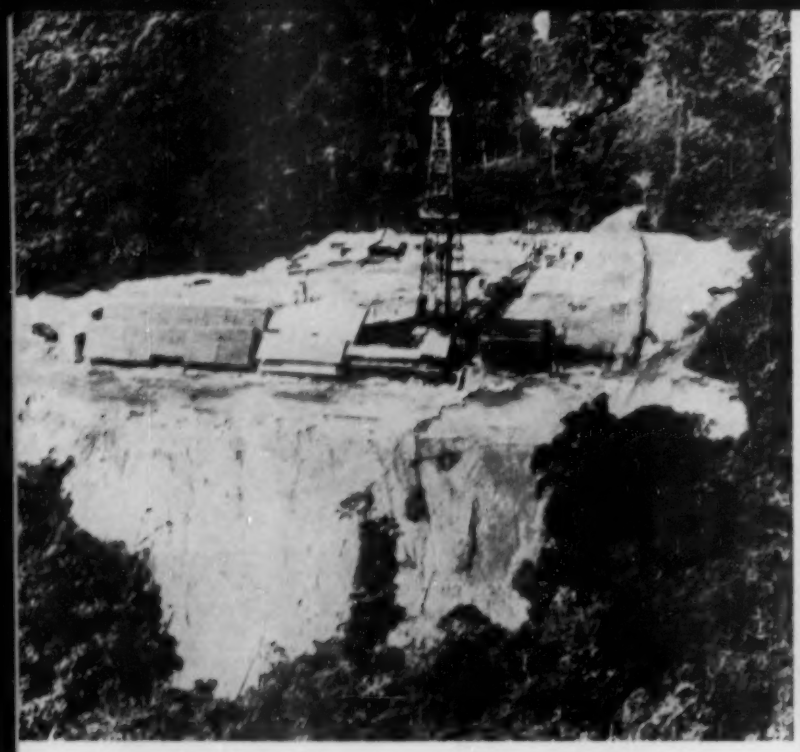
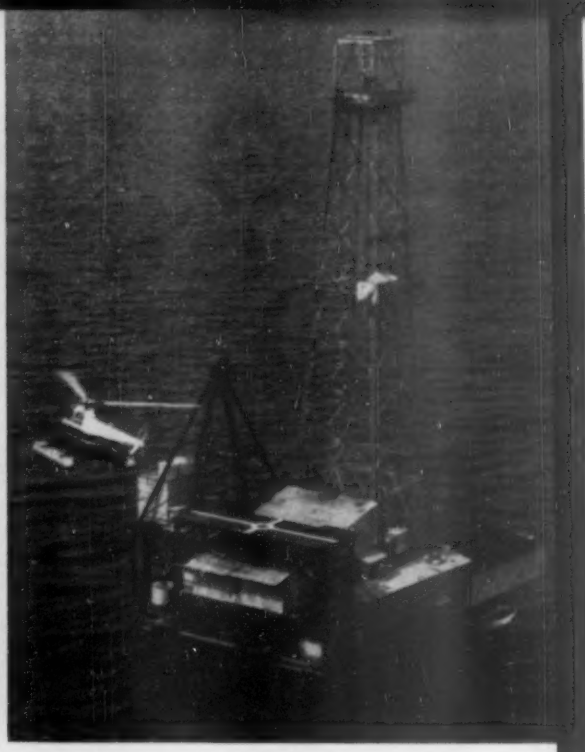


Poor showing of Jerudong wildcat in Borneo . . .



switched emphasis offshore as . . .

Drilling Stepped up in South China Sea

BRITISH MALAYAN PETROLEUM CO., LTD., got its feet wet in the South China Sea 2 years ago, but the Royal Dutch - Shell company is poised now for a headlong plunge into offshore drilling.

The company operates British Borneo's Seria field in Brunei. It's easily Far East's largest field, and has produced more than 322 million barrels of crude since its discovery in 1929. Seria's output last year averaged 105,750 bbl. daily.

But, on land, Seria faces a declining future. The field's 290 wells have just about defined Seria's land limits. B.M.P. is looking to sea to increase the size of the field and maintain its production. T. R. Groundwater, technical manager, explains.

"Unless we find our future at sea, we must face the fact that we are a healthy, but declining oil field," he says.

Water drilling plans . . . Eight marine drilling platforms for the South China Sea off British Borneo's coast are in B.M.P.'s plans for the rest of this year and 1957.

Seria already has three offshore platforms and a fourth is about ready to go into operation. The company wants to add three more before the end of 1956 and five next year.

The three platforms now in use are about a mile offshore. The fourth, which will probably spud in this month, is about 1,000 ft. from the coast.

The Royal Dutch-Shell affiliate first started its marine development of Seria more than 2 years ago when it drilled the first offshore well in the British Commonwealth. Before that a number of wells were slanted from the beach areas.

The first platforms had 28 tubular piles 24 in. in diameter and a 110 by 45 ft. deck capable of supporting 200 tons. They were built in a harbor and towed to the offshore location in about 30 ft. of water. The platforms were set up a mile from shore and about 3 miles apart.

SOUTH CHINA SEA BECKONS T. R. Groundwater, British Malayan's technical manager who looks offshore for new reserves.

B.M.P. drilled one vertical and three slant-hole wells from the first platform it built.. Two of these wells are now producing more than 900 bbl. of oil daily from formations between 4,000 and 9,000 ft. One well has not yet been completed and the fourth was a gas well. Only two wells were drilled from the second platform. One produced oil but was abandoned because of water encroachment.

Drilling was recently started from a third marine platform about 2 miles from the second.

An unusual feature of the early program was the aerial ropeway system built to serve the platforms with both manpower and supplies. The long periods of stormy weather in the area created special problems for boat transportation *(The Oil and Gas Journal, November 1, 1954, page 75).*

The British-built Westland "Whirlwind" helicopters capable of carrying 7 passengers or lifting 1,500-lb. freight loads have arrived in Seria to serve the offshore platforms in the new operation. The existing platforms have been provided with 'copter landing decks and this feature will be standard on all future platforms.

The large 'copters will replace two

smaller aircraft that have been in use at Seria for 18 months. The larger craft were sent to British Borneo from New Guinea where they were used by a Shell affiliate to fly component parts of a specially-lightened drilling rig to a jungle site that was inaccessible by wheel vehicles.

Decline in prospect . . . Seria production last year was nearly 4,000,000 bbl. more than could reasonably have been expected from the almost fully developed field. B.M.P.'s technical manager says the extra production was the direct result of each of the 290-odd wells in the field receiving "more or less personal attention" from company engineers.

Because of improved drilling methods, increased penetration rates, and other new techniques, future drilling locations are being used up rapidly.

"If we don't find extensions to this field, or find a new field, a reduction in our activities is not far away," Groundwater says. "To face long-term realities, the fact is that apart from a wildcat at Jerudong, we have not found new oil in recent years. We are living off the bountiful yield of Seria field."

B.M.P.'s exploratory efforts have covered the land areas of British Borneo with what Groundwater calls a "small-toothed" comb, but they haven't found any new oil.

Seria's production comes from two main zones. The first is found from 2,000 ft. to 3,000 ft. and produces a heavy, asphaltic, 17°-gravity crude. Wells completed in these zones make from 225 to 340 bbl. daily. A newer and deeper zone, found between 5,000 and 7,000 ft., produces a much lighter and waxy 38°-gravity crude. These wells flow from 600 to nearly 1,000 bbl. daily.

Jerudong disappointing . . . The only promising well in last year's drilling of 53,913 ft. of hole at 12 locations was the Jerudong wildcat, about half way between Seria and Brunei Town, the state capital.

The well produced more than 3,500 bbl. in tests, but stepouts have been dry.

Groundwater says the Jerudong structure is clearly very complicated and faulted. The company regards the four wells it has drilled near the discovery as necessary and the effort that went into them worthwhile. "But," Groundwater says, "we cannot afford to go on drilling such a high proportion of dry holes. Our future policy on land must be one of caution until sea prospects have been fully investigated."

So, B.M.P. is going to sea.

Y.P.F. Wants to Double Size

THE Argentine Government is nearing the first milepost in its drive to nearly double the domestic oil industry within 3 years.

Since the decline and fall of Juan Peron last September, the government has been busy courting U. S. and European financiers for $250 million in construction loans. Interested parties there must submit proposals—or alter those already submitted—by May 15.

Next step will be the call for actual bids. If financing is arranged, construction and development work would begin almost immediately.

Planned expansion of the oil industry is only one symptom of Argentina's renewed efforts to stimulate its economy with outside capital. The new regime, headed by Gen. Pedro Eugenio Aramburu, is anxious to reattract firms long wary of the vagaries of Peronism. The deposed dictator made it tough for outsiders by insisting profits be kept in Argentina, requiring firms to seek special government permission to enter the country, and seizing various foreign-owned industries.

The big emphasis now is on insuring a political and economic climate favorable to foreign investors. Aramburu's first concrete steps have included devaluing the peso, easing controls on foreign trade, and moving to free frozen corporate profits.

What is planned . . . This is the backdrop for the country's ambitious oil program. The expansion is an attempt to develop the industry quickly without depending on foreign oil firms. All contracts would be between bidders and the government-owned operating company, Yaciementos Petroliferos Fiscales (Y. P. F.). Argentina's Central Bank would guarantee Y.P.F. obligations.

The government company is certain it can boost production from 69,000 bbl. daily to 172,500 bbl. daily providing it can improve transportation and complete its refinery-building program.

To handle the production increase, Y.P.F. plans a $76-million natural-gas pipeline from Campo Duran to Buenos Aires, a $24-million crude line from Campo Duran to San Lorenzo, and a $19-million crude line from Mendoza to San Lorenzo.

The company also would sink $13 million in process and development plants in Campo Duran, $15 million in expansion of Lujan de Cuyo refinery, $18 million in expansion of Buenos Aires-area refineries, $4 million in lube-oil plants, and $5 million in terminals.

Another $76 million is earmarked for contract drilling and purchase of drilling rigs and other field equipment.

Y.P.F. is studying three types of proposals from foreign investors: straight loans of foreign currency; currency plus equipment; and equipment and supplies alone.

Pemex Tests Hit

Six discoveries since March reported by Mexican firm

PETROLEOS MEXICANOS has brought in six discovery wells since mid-March, including five in the State of Veracruz and one near the city of Reynosa.

Two of the Veracruz discoveries are already on production. Boca de Lima, located between Gutierrez Zamora and the Gulf of Mexico near Miguel Hidalgo field, was completed at 6,930 ft. and is making 600 bbl. daily. Las Canas, near Alamo and north of the new Golden Lane trend, was completed at 3,795 ft. It has an output of 200 bbl. daily of heavy crude.

The three remaining Veracruz discoveries were: San Andres, located 35 miles southwest of Papantla near the Puebla border; Lomo de Pozo, 21 miles southwest of Tampico; and Mata Espino, 15 miles south of the city of Veracruz near Angostura field.

In northeastern Mexico, Guillermo No. 1, located between Reynosa and Brasil fields, came in as a gasser testing 2,000,000 cu. ft. daily. The test, completed at 8,145 ft., opened a new field which gave hopes of adding important new gas reserves to the area.

Legalities Snag Hawaii Plant

Standard Oil Co. of California has selected a site and started design work on its proposed $30-million Honolulu refinery. But an act of Congress might be necessary before construction can get under way.

President T. S. Peterson said the preferred site is on government-owned Sand Island in Honolulu Harbor. The Territorial Government and the city and county of Honolulu have approved the zoning and the sale of the land at public auction. Standard will submit a bid.

It was originally believed that an executive order could release the land, but the Justice Department now thinks the transfer will have to go through Congress.

Russians Exploit Deal

Propagandists calling Dresser enthusiasm for turbodrill proof of Soviet superiority in some scientific fields

SOVIET propagandists are using the Russian turbodrill licensing arrangement with Dresser Industries as proof that the U.S.S.R. is already superior to the United States in some fields of science and technology.

Articles emphasizing this theme in connection with the turbodrill have been featured prominently in most of Moscow's major newspapers and magazines. The story has received even larger play in Soviet foreign-language publications circulated throughout the world.

According to these accounts, American enthusiasm over the turbodrill explodes the myth of Russian technological backwardness. It shows that unrestricted trade with Communist nations would be highly advantageous to the West.

The magazine New Times, which is printed in 10 languages and reflects the views of the U.S.S.R. Ministry of Foreign Affairs, declared:

"The agreement signed between the American Dresser Industries firm and the Soviet Machinoexport organization has attracted the attention of U. S. business circles . . .

"However, the turbodrill agreement is not to the liking of all. U. S. State Department spokesmen have expressed dissatisfaction over the transaction. They are afraid it will be regarded as recognition of considerable technological achievement by the Soviet Union . . . Evidently the State Department fears there may be some unfavorable comparisons . . .

"It is hard to say whether the U. S. State Department will now relinquish its beloved foreign trade concepts which are so obviously out of joint with the times. In any case, the turbodrill agreement is a blow to the groundless and absurd stand taken by champions of 'strategic' trade barriers."

Komsomolskaya Pravda, in a front-page story, commented that the turbodrill has forced Soviet critics in Western nations "to recognize our successes and achievements." It asserted that Dresser vice president J. B. O'Connor "couldn't conceal his rapture" while observing the turbodrill in operation in Bashkiria.

The newspaper Moscow News reported:

"The obvious successes of Soviet technology, particularly in oil well drilling, oblige those in America who regard Russian statements skeptically to change their minds. Even the Wall Street Journal quotes Dresser Industries vice president O'Connor as declaring that Soviet turbodrills outclass everything made in this field by American engineers."

Literaturnaya Gazeta quoted the Christian Science Monitor as stating that "the story of the turbodrill points up the fact that the West has no monopoly on technical experience." The Russian paper criticized "short-sighted people" who believe the West has everything to lose and nothing to gain by trading and exchanging scientific information with the U.S.S.R.

S. M. Dvorkin, Machinoexport vice president, interviewed by the Russian magazine News, said:

"I am not exaggerating when I say that Mr. O'Connor was simply dumbfounded (when a turbodrill achieved a speed of 100 ft. per hour through the same formation in which a rotary drill made only 2 ft. per hour). All he could say was: 'Your people should be proud of the Soviet engineers who made this wonderful machine'."

Deal under study . . . Meanwhile, in Washington the Dresser arrangements with Russia have been placed before Commerce Secretary Sinclair Weeks for review.

Weeks has before him also an interdepartmental committee report and recommendations whether Dresser should be permitted to export to Russia the techniques and details for manufacturing rock bits.

The Dresser-Russian deal called for purchase by Dresser of 40 turbodrills. They would be accompanied by Russian experts to explain their manufacture. In return, Dresser would supply Russians with the knowhow of making rock bits. It is reported the Russians have been making rock bits, but so far haven't turned out a really satisfactory product.

The interdepartmental committee which studied the deal included representatives of State, Interior, Defense, Commerce, and other interested agencies. Details of its recommendations have not been made public.

LAGER FROST BONE BUCHANAN DECKARD

Conorada to Start Libyan Search

OASIS OIL CO. of Libya, subsidiary of Ohio Oil Co., is setting up offices in Tripoli as newly designated operator for the Conorada group to explore its 35,000,000 acres in concessions granted by the Libyan Government.

Albert F. Lager, former resident manager for Conorada in Tripoli, will hold the same position for Oasis, which will direct exploration for Ohio, Continental Oil Co., and Amerada Petroleum Corp. Each holds a one-third undivided interest in the concessions.

Conorada, a service group owned by the three companies, carried out surface geological exploration prior to negotiations for the concessions. Oasis is taking over the Conorada operating office and will add 14 geological and geophysical personnel in addition to key men already appointed.

Manager of exploration will be V. L. Frost, formerly of Ohio Oil's Casper production division. R. M. Bone, also with Ohio at Casper, will be Oasis' geophysicist. Other staff members at Tripoli will be C. M. Deckard, formerly of Ohio's general office at Findlay, controller, and T. C. Buchanan, former supervisor of Ohio's Indiana transportation district, manager of supply and transportation.

Carbon-Black Plant Planned

The first carbon-black plant in the southern hemisphere is being built at Geelong, Victoria, Australia, by Shell Petroleum Co. and United Carbon Co.

The plant will cost about $5 million. It will operate on heavy petroleum fractions from Shell's 36,000-bbl. daily refinery at Geelong. The plant will produce about 16,000 tons of carbon black a year, enough to satisfy Australia's domestic carbon-black needs and leave a surplus for export.

Podco Signs Pacts

● Philippine firm makes joint development deals with Socal, Texaco

A LOCAL company which has started the first well in the current Philippine Islands exploration program signed another set of joint development agreements last week with two American oil companies.

Philippine Oil Development Co. has given California Asiatic Oil Co. and Texaco Overseas Petroleum Co. the option of acquiring 25 per cent interest in Podco acreage in exchange for sharing exploration and development costs.

Podco has a similar cross-option arrangement with Standard-Vacuum Oil Co. It grew out of the settlement of overlapping concession applications in the Cagayan Valley of northeast Luzon.

The new agreements with the Standard Oil Co. of California subsidiary and The Texas Co. subsidiary were disclosed by top officials of all three companies last week.

They provide that Cal-Asiatic and Texaco may exercise their options within 60 days after Podco notifies them it has found production on its acreage. The two American companies would then each furnish 25 per cent of further exploration and development costs and obtain 25 per cent each of all production.

The two companies each has a one-half undivided interest in seven exploration concessions covering 1,235,000 acres in the Cagayan Valley *(The Oil and Gas Journal, January 2, page 64)*. Podco's acreage is in the same area of northern Luzon.

Texaco and Socal have both done exploration work in the Philippines and plan an intensive program through a single management company.

Stanvac has eight exploration concessions totalling 959,500 acres in the same area of Luzon where the other three companies are operating *(The Oil and Gas Journal, January 30, page 137)*.

The Philippine Government approved the plan whereby the disputed area was divided into three sections. Podco got two of the three sections and Stanvac one, but the two companies worked out a cross-section agreement for two of the areas. Each company has the option of acquiring one-third of the production in one section held by the other. The third section is to be held exclusively by Podco.

The Philippine company is the only one of the four to actually start drilling in the Cagayan Valley. It has started one well which was drilling below 4,000 ft. at last reports.

Colombia Pilot Flood Planned

A PILOT water flood will get under way within the next few weeks to determine if secondary-recovery treatment will increase the dwindling production of two of Colombia's oldest producing oil fields.

Forest Oil Corp., Bradford, Pa., and San Antonio, Tex., will conduct the pilot project under contract with Empresa Colombiana de Petroles, the Colombian Government oil company. If the initial five-spot pattern is successful, Forest will extend the project to the entire 13,000 acres of La Cira and the 7,000 acres of Infantas fields.

The two fields are in the old De Mares concession which reverted to the government in 1951 when the concession term expired. It was being operated by International Petroleum Co.

Forest Oil began negotiating with Empresa for the secondary-recovery project several weeks ago and the contract was actually signed last month. It was formalized last week by President Gustavo Rojas Pinilla.

Forest has already drilled four input wells in La Cira field and has ordered all the materials for an electrically powered pressure plant for the water injection. Fresh water will be injected into one of the input wells. Salt water obtained from Empresa's dehydration plant at El Centro will be injected into the other three wells.

Forest officials said last week that pressures and rates of injection are still to be determined.

Forest expects to spend $1 million on the pilot project. Its contract for water flooding the entire 20,000 acres in the two fields hinges on the success of the pilot operation. If the project proves feasible, Forest will operate both La Cira and Infantas fields as a full-scale secondary-recovery project for the Colombian Government.

Frederick D. Douglas, Midland, who is now in charge of Forest's West Texas secondary-recovery operations, will take charge of the Colombian project and will be headquartered at El Centro.

International BRIEFS

A 3,000-bbl. Unifining-Platforming unit has gone on stream at the 12,000-bbl. Erdoel-Raffingerie Deurag-Nerag refinery at Hanover, West Germany.

Jordan businessmen have a plan afoot to finance the construction of the country's first refinery in conjunction with the government. The 5,000-bbl. plant would be built at El-Zarka, 15 miles from Amman, and take crude from Iraq Petroleum Co., Ltd., and Trans-Arabian Pipeline Co. pipelines. It would fill domestic demand for gasoline, fuel oil, and asphalt. Backers hope to have the refinery on stream in 1958.

A public-opinion survey conducted recently in Brazil came up with the surprising finding that a majority of Brazilians favor participation by foreign companies in the development of the country, including the oil industry. Brazil's oil industry is state controlled.

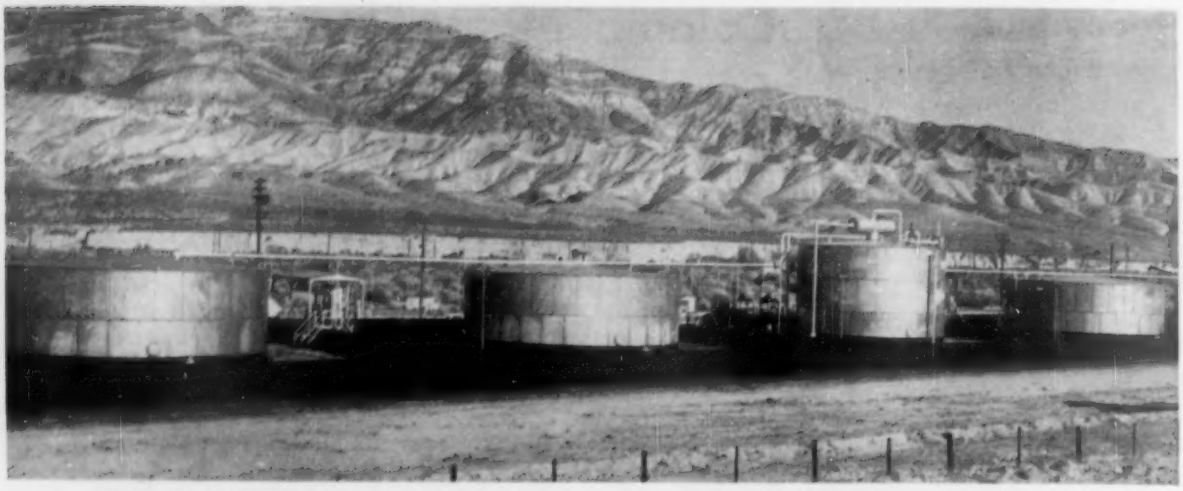
In the past, it has been generally agreed the public was against opening the country to international oil companies. This is one reason why the government has opposed the passage of an oil law which would permit concession grants to foreign firms.

Phillips Petroleum Co. has licensed Societe Solvay et Cie, a Belgian firm, to use its new low-pressure polyethylene process in Italy. The company will have exclusive rights to Phillips patents and knowhow to make the plastics in Italy. Solvay et Cie is a major European manufacturer of plastics and chemical products. Phillips is building a polyethylene plant on the Houston Ship Channel and has licensed other firms to use the process in the U. S.

Procon Inc., subsidiary of Universal Oil Products Co., has formed Procon International, S. A., to handle foreign construction of petroleum-process facilities. The first major project is a 20,000-bbl. daily refinery for The Texas Co. in Cuba. Procon International will have headquarters in Chicago and a branch office at Santiago de Cuba. Operations are expected to be centered in South America.

Russia reports it has made an important gas discovery in the far-northern Komi Autonomous Republic, only 200 miles below the Arctic Circle. The newspaper Pravda said that Dzhebolsk No. 1 near Ukhta flowed gas at the rate of 800,000 cu. m. per day from perforations at 5,150 ft.

A new oil exploration company, Francaise de Recherches et D'Exploitation de Petrole, has been formed in Paris. The French Government agency, Bureau des Recherches de Petrole, and two oil investment trusts, Finarep and Cofarep, will participate in the concern.



CENTRAL DEHYDRATION PLANT handles the entire unit's oil production of approximately 8,000 bbl. daily.

Here are the advanced techniques employed at

California's Biggest Water-Injection Project

Unit uses both skimming pits and flotation cell to free oil from water. Filters are leaf-type using a coating of asbestos and diatomaceous earth. They operate under pressure and maintain constant throughput.

by D. H. Stormont
District Editor

THE peripheral water flood under way in the Dibblee unit at Russell Ranch field typifies the most modern thought in surface handling of water and in controlling its advance through a highly faulted, multiple sand reservoir.

The project, carried out by unit operator Richfield Oil Corp., is California's largest water-injection project. Currently about 22,000 bbl. daily of brine and shallow well water is being injected into the 3,000-ft. pool. In the next few months the volume will be stepped up to 35,000 bbl. Within the next several years some 70,000 bbl. daily will be injected.

Follows pilot flood . . . Russell Ranch, in central Cuyama Valley, was discovered in June 1948. Unitization of the Dibblee zone, the field's principal pay, was effected in September 1950. Pressure maintenance by gas injection was started prior to the unit's formation and is continuing. Full-scale water injection was started last year, after a pilot flood showed its feasibility.

The 1,200-acre pool contains 98 of the field's 155 producers. They are producing about 8,000 bbl. daily, plus an approximately equal volume of brine. Net gas production, as well as all water produced in the field, is returned to the Dibblee pay.

Pay characteristics . . . The zone covers an area about 4½ miles long by ½ mile wide. The structure is primarily monoclinal, as shown in the accompanying map.

The upstructure edge is cut by a lateral fault having an apparent vertical displacement of about 1,500 ft. Crossfaulting has complicated the structure by warping the formations, causing beds within various fault blocks to assume an anticlinal appearance. Formation dip, at rates of 15° to 30°, is to the northeast.

Dibblee wells average some 3,000 ft. deep. As shown on the type electric log, the interval consists of eight or more oil sands interbedded with impermeable shales. Maximum thickness of the producing interval is approximately 650 ft. As much as 350 ft. is net oil sand. Average net sand thickness is about 125 ft.

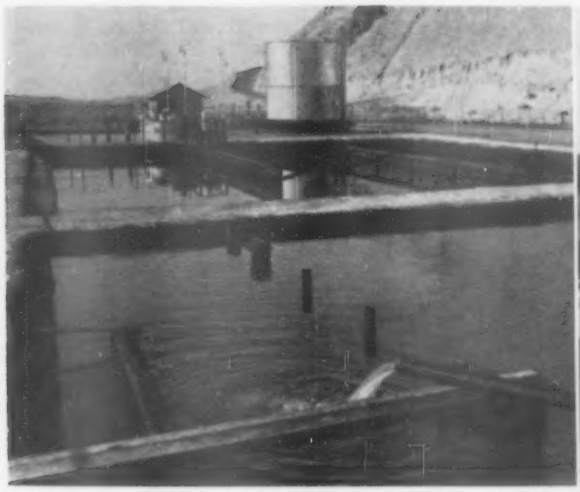
Original oil-water contact was approximately 1,310 ft. subsea on the southern flank. The slightly tilted water table rises to the northwest, reducing the thickness of the oil sand. As there is evidence that a fault roughly parallel to the crestal fault cuts the Dibblee zone downdip, it is believed unlikely that a strong natural water drive will develop. Initial reservoir was about 1,300 psi.

Average porosity of the unconsolidated, medium to coarse sands is 25 per cent. The upper 200 ft. of producing interval has an average permeability of about 150 md. The next 450 ft. of the zone averages approximately 400 md. Reservoir oil viscosity of the 34°-gravity crude is 1.43 cp. Initial solution gas-oil ratio was about 350 cu. ft. per barrel.

Gas returned . . . Gas is injected in six upstructure wells, each located near the crest of the fault block they serve (see map). Injection is at the rate of approximately 20,000 M.c.f. daily, at pressures ranging from 1,200 to 1,800 psi.

As of the first of the year, when cumulative oil withdrawals were 32,800,000 bbl., about 35,000,000 M.c.f.

PRODUCING



CENTRAL SKIMMING POND where about 17,000 bbl. of oil field brines is being handled daily, prior to reinjection.

NEW FLOATATION CELL (right) and wash and surge tanks help solve floating-oil problem in preparing the brines for reinjection.

of gas had been injected. This volume represented some 73 per cent of all gas produced since the field's discovery. It has resulted in the net produced ratio being lowered to 340 cu. ft. per barrel, or approximately equal to the initial solution ratio.

Brine facilities . . . Separation of oil and water from unit wells is carried out at a central dehydration plant. Water freed in the 5,000-bbl. wash tank is pumped to the nearby skimming pond and filtering plant. There it is joined by waste water from trap farms serving nonunit Russell Ranch wells.

These facilities are an outgrowth of those used prior to start of the peripheral flood. Then the treated and filtered brines were being injected into disposal wells.

Rated at 20,000 bbl. daily capacity, the concrete-lined pits are rapidly reaching capacity for handling the field's water output. Currently the average volume is about 17,000 bbl. daily. But fluctuations in the disposal rate, caused by test tanks being dumped during daylight hours, frequently result in the pits temporarily being overloaded.

To remedy this situation new facilities have been added which handle free water knocked out at seven trap farms. As is later described, these include a flotation cell capable of handling some 6,000 to 10,000 bbl. of brine daily.

At the central treating plant, field waters pass through two baffled pits where the oil is skimmed off. The brine then is pumped through diatomecous earth filters and run to a surge tank from which it is distributed to seven injection wells.

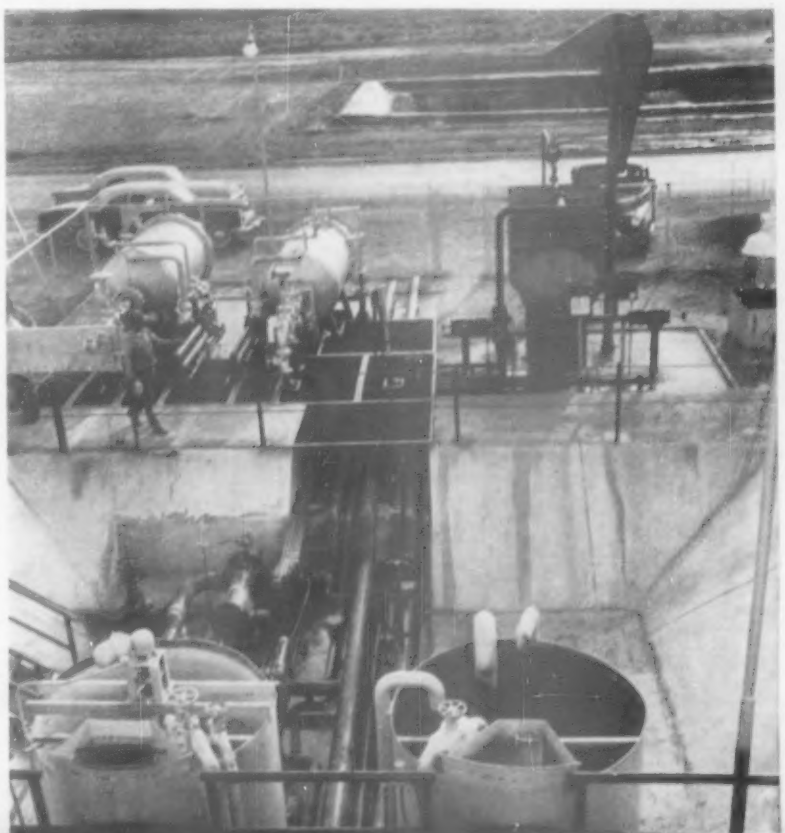
. . . Chemical treatment carried out is to prevent formation of scale and for bacteria, algae, and corrosion control. Phosphate, injected at the trap farms, is used for scale inhibition. Quaternary ammonia compounds are used to inhibit corrosion, algae, and bacteria. These are added at the inflow line in the skimming pond.

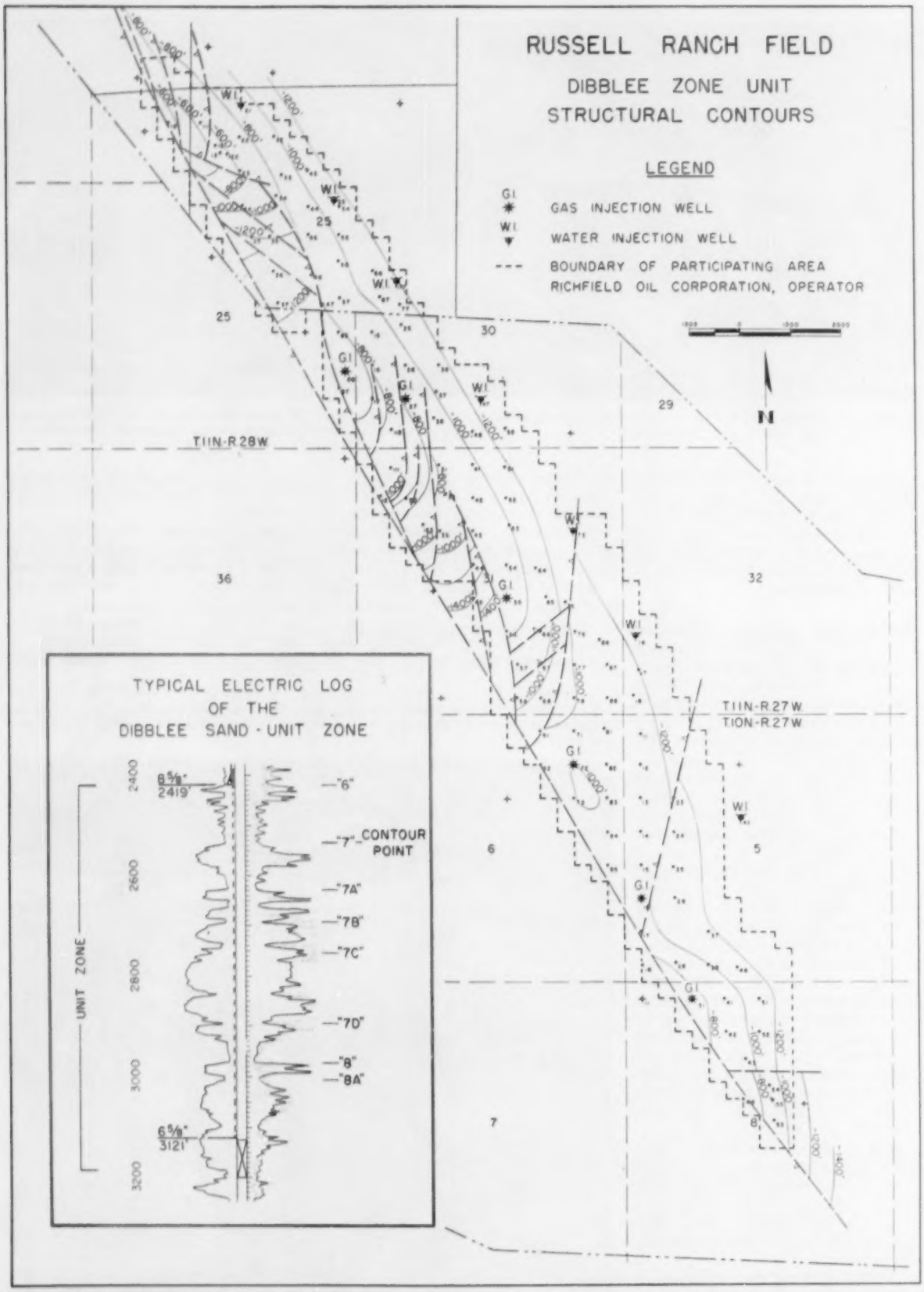
Richfield has adopted the attitude that these waters will ultimately be again produced and, accordingly, is exercising care to keep the brines as noncorrosive as possible. So far it has been no problem, even though no lining is used in the distribution and injection system.

Sulfate-reducing bacteria are a problem. Various organic and inorganic chemicals have been used. Some prove highly effective for a while but then lose their inhibiting properties.

Wax also is a problem. Since it is approximately the same gravity as water, it fails to separate out in the

FILTRATION of Russell Ranch brines is carried out in two pressure filters, (left) employing diatomaceous earth as a filter aid. New type filter, right, on test here, employs a wood-pulp precoat.





THE DIBBLEE ZONE peripheral water flood is being carried out through seven downstructure injection wells, so located as to insure distribution of water to all fault blocks.

skimming pits. Average oil content is about 50 p.p.m. Removal of such large quantities in the filters places an added load on them.

Filtration plant . . . Filtration is carried out in two pressure leaf-type units operated in parallel. Water is divided equally among the units. A flow-rate controller, equipped for automatic reset, maintains a constant flow rate through each filter regardless of the pressure drop. When the pressure differential reaches about 25 psi., the units are backwashed and precoated with a mixture of asbestos and diatomaceous earth.

From the filters the water moves to a 1,000-bbl. surge tank. From there two engine-driven centrifugal pumps take suction and discharge into the field distribution system. The flow-rate controller automatically operates to maintain a constant level in the treated water tank.

A float-operated control regulates the engines driving the centrifugal pumps, speeding them up if the water level tends to rise in the skimming basin. Low-level mercury switches in the surge tank automatically shut down the engines if the water level drops too low in the tank.

. . . The flotation cell has relieved the skimming pits of their overload, and helps solve the floating oil problem.

Water from knockouts at seven trap farms, with a current output of about 6,000 bbl. daily, is run to a 1,250-bbl. wash tank. It then gravitates to a 500-bbl. surge tank, from which it is pumped into the 800-bbl. cell.

Gas at 45 psi. is injected through the eye of an impeller as the water is discharged into the cell. Approximate ratio is 1 cu. ft. per 60 gal. of brine. Effect of the finely divided gas bubbles is to reduce the oil content from about 500 p.p.m. to some 18 to 35 p.p.m. The two small tanks and a 5,000-bbl. storage tank are held under a gas blanket at all times.

From the storage tank the treated water gravitates to a new filtration plant erected near the distribution main. After passing through a new-type high-volume pressure filter, the water goes to a surge tank. Centrifugal pumps discharge the water into the distribution system.

Additional water . . . With oil-well brines supplying about 17,000 bbl. daily, remainder of the water required is automatically supplied by a shallow well completed in Santa Margarita sands. This saline water is highly compatible with the oil-field brines.

The water well, currently supplying some 5,000 bbl. daily, feeds into a 1,600-bbl. tank placed about midway along the main line serving the seven injection wells. A gas-engine-driven centrifugal pump charges water into the injection system as line pressures require. Automatic controls start up or shut down the water well pump to maintain the level in the tank within set limits.

Injection system . . . Both the well water and treated-water pumps operate to maintain 200-psi. pressure on the distribution main. This pressure is sufficient to supply water to the geographically highest injection well at approximately 50 psi.

One to as many as three engine-driven triplex pumps are set at each input well, depending upon the individual well's water allotment.

At the first injection wells a shed was built over the pumping unit and a 250-bbl. surge tank was installed. These were eliminated at the new wells. There, the pumps take suction directly from the distribution main and discharge into the input well.

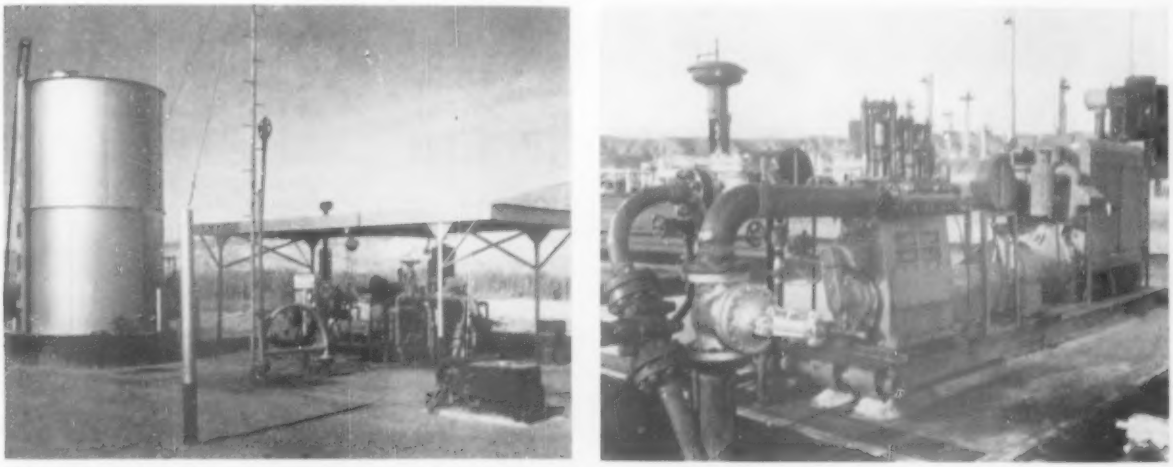
At these installations a pilot-operated diaphragm is connected to the engine throttle. As long as an adequate water supply is available the engine operates at relatively constant speed. If the supply is interrupted for any reason, the unit continues operating but all water circulates through a bypass back to the pump suction.

In the cases where suction is from a surge tank, height of the water level in the tank is automatically controlled. All engines are equipped with high-temperature, low-oil-pressure shutdown devices. Well-injection pressures range from about 300 to 1,000 psi.

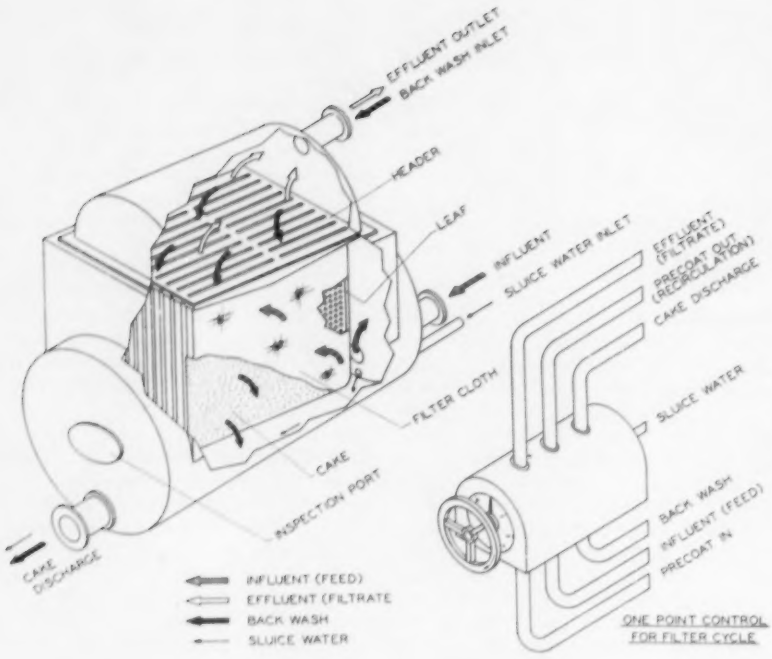
Controlling water advance . . . The volumes of brine being injected into each of the seven input wells is regulated so as to maintain a uniform rate of advance along the eastern flank of the structure. Meters set at each well register the input volumes injected.

In addition to equipment controlling the volume injected in each well, equipment has been developed for regulating the amounts going into each of the eight or more oil sands. If surveys show too much or too little water is being injected into a particular sand, the choke size can be changed without pulling the flow string.

At the first of the year a total of 9,290,000 bbl. of brine had been injected in the Dibblee zone. It has been estimated that 175,000,000 bbl. of makeup water will be required in carrying out the project. More and more field water will become available as water cuts increase. But during the next several years, as water injection is increased toward the 70,000-bbl. daily ultimate, shallow water wells will be added as required to keep the flood moving upward.



OLD-STYLE (left) and new-style pumping equipment (right) installed at each injection well. The uncovered new-type units take suction directly from the distribution main without use of a surge tank.



New-Type Pressure Filter

Proves Worth at Russell Ranch

by D. H. Stormont
District Editor

A NEW-TYPE pressure filter designed for handling large volumes of oil-field brines gave a highly satisfactory performance on field tests recently conducted by Richfield Oil Corp. at Russell Ranch in Central Cuyama Valley, California.

With a filter surface only one-half that of conventional leaf-type units, the new low-cost filter was found capable of efficiently handling twice as much water.

Other features include those for rapid, thorough backwashing with minimum volumes of water, and a one-point control system for regulating the filtering, backwashing, and precoating stages. Use of wood pulp in place of asbestos sharply lowers the cost of precoating.

Test run . . . The filter handled brines during a test run from the 98-well Dibblee zone, for which Richfield is unit operator, and from other nonunit wells in the field. About 17,000 bbl. of brine was collected at the central treating plant. There free oil was removed in a 20,000-bbl.-daily-capacity skimming plant.

The combined oil-field waters leaving the skimming ponds have an oil content of approximately 50 p.p.m., and a turbidity of 35 to 45 p.p.m. (Helige-optical). Iron content is in the range of 1 p.p.m. Chemical treatment carried out is to prevent formation of scale, and for bacteria, algae and corrosion control. Following filtration the treated water is injected into the Dibblee zone, in which a peripheral flood is being carried out.

Principle of operation . . . The new-type filter is shown in the accompanying diagram and photographs. The steel body and cover are plastic coated inside. Quick-opening doors at either end permit ready inspection to determine if any filter cake remains after backwashing.

Filtration is through 10 anodized aluminum leaves which have approximately 310 sq. ft. of filter area. They are covered with Saran filter cloth. Streamlined passageways between the individual leaves provide unrestricted filtration and backwashing.

As indicated in the diagram, flow of water is always upward. Any entrained air or gases thus are driven into the dome above the filtering area. They cannot result in the loss of filter area, or cause the upper portion of the leaves not to be properly precoated. A relief valve in the top of the dome vents any accumulations to a nearby pump.

Backwashing . . . The filter is provided with a large basin and outflow line for collecting and discharging the cake during backwashing. Water present in the unit when filtration is halted is substantially all that is needed for dumping the cake.

Backwashing is carried out from the inside of the filter cloth, by means of ½-in. slots provided along the top of the leaf. This prevents oil and wax being caught in the filter screen, where it might then be picked up by clean water after filtration is resumed.

. . . Filtration rate for which the unit was designed was 1 g.p.m. per sq. ft.

PRODUCING

of filter area. On short tests at Russell Ranch, rates as high as 1.5 g.p.m. per sq. ft. were achieved. In conventional diatomaceous earth and stone filters the accepted rate is 0.5 g.p.m. per sq. ft. If this rate is much exceeded, maintenance costs become excessive.

In a 20-hour test run, throughput was at the nominal rate of 17,000 bbl. daily for 8 hours. Average rate for the period was 14,760 bbl. daily, or at the rate of 1.39 g.p.m. per sq. ft. Inlet pressure throughout most of the test was 39 psi. Initial pressure drop across the filter was 8 psi. At the conclusion it had reached 34 psi. Throughput at this time had dropped to a 12,300 bbl. per day rate.

. . . **Filtration costs** for the unit when operating at 14,760-bbl. and 8,400-bbl. daily rates, and those of conventional diatomaceous earth pressure filters are shown in the accompanying chart. Exclusive of depreciation, that for the high rate was approximately 1 mill per barrel. Based on a 10-year life, total costs were estimated to be 1.3 mill per per barrel.

Use of wood pulp instead of asbestos for the precoat results in a considerable savings. The average precoat for the new filter consisted of 12 lb. of wood pulp, costing 10 cents per lb., and 25 lb. of diatomaceous earth at 3 cents per lb. This compares with 12 lb. of 45-cent asbestos and 50 lb. of diatomaceous earth for conventional filters.

The wood pulp was found to give an excellent base for diatomaceous earth precoat. When wet it tightly adheres to the plastic filter cloth. Its good shear-plane characteristics make for easy cake discharge when backwashing.

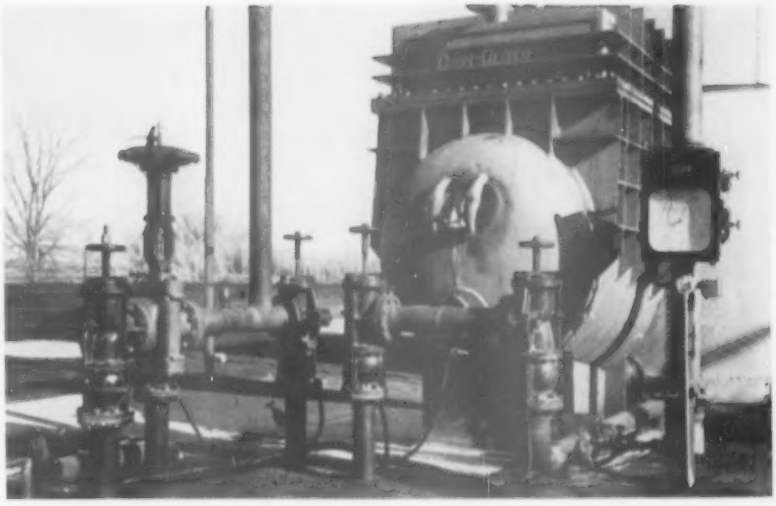
. . . **The remote control system** makes for a material reduction in down time and labor costs during the backwash and precoat cycle. It also almost entirely eliminates possibility of the operator opening a wrong valve, causing an unused precoat to be dumped or water run to the filter before it is precoated.

The centralized control is made possible by use of hydraulic-operated valves. These valves can be opened and closed under pressure without danger of shock.

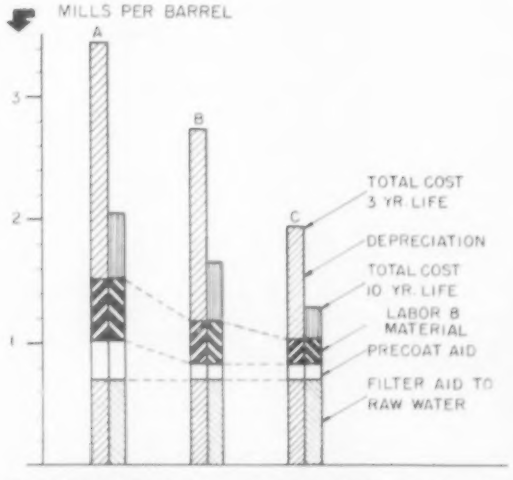
Hydraulic lines are run from each of five feed valves and the large dump valve to a control wheel mounted adjacent to the precoat tanks. From this point the operator can control the filter cycle, and at the same time can watch operating conditions in the tanks. Clockwise rotation of the control wheel results in automatic valve operation for each step in the operating cycle.

The filter has not been in operation long enough for this step to be necessary, but it is expected that the filter cloths will be washed in place. Detergent solution will be added to the backwash water and circulated through the unit. Thus it is expected that the filter leaves will have to be pulled only when the plastic filter cloth needs replacement.

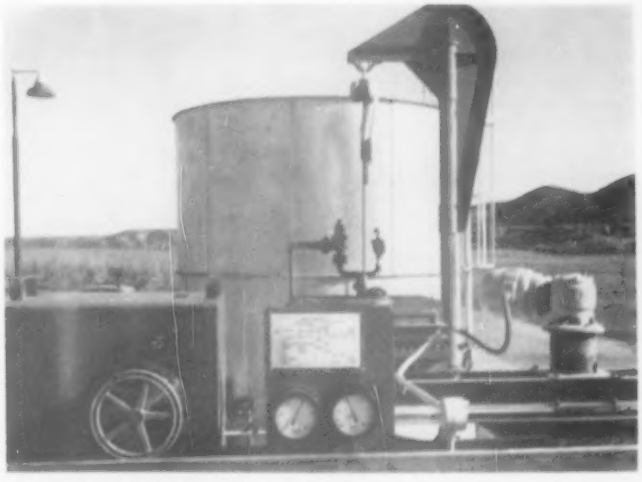
Since the field tests, the unit has been placed in regular operation at a new filter plant built on the southern end of the field. There it is used in conjunction with a closed system which employs a flotation cell rather than skim ponds to remove all of the approximately 500 p.p.m. of suspended oil.



FIVE HYDRAULIC-OPERATED valves (Vulcan) and the dump valve are operated from the control panel mounted near the precoat tank.



COST COMPARISON of a conventional filter operating at 8,400 bbl. per day (A), and of the new type filter operating at 8,400 (B), and 14,760 bbl. per day (C).

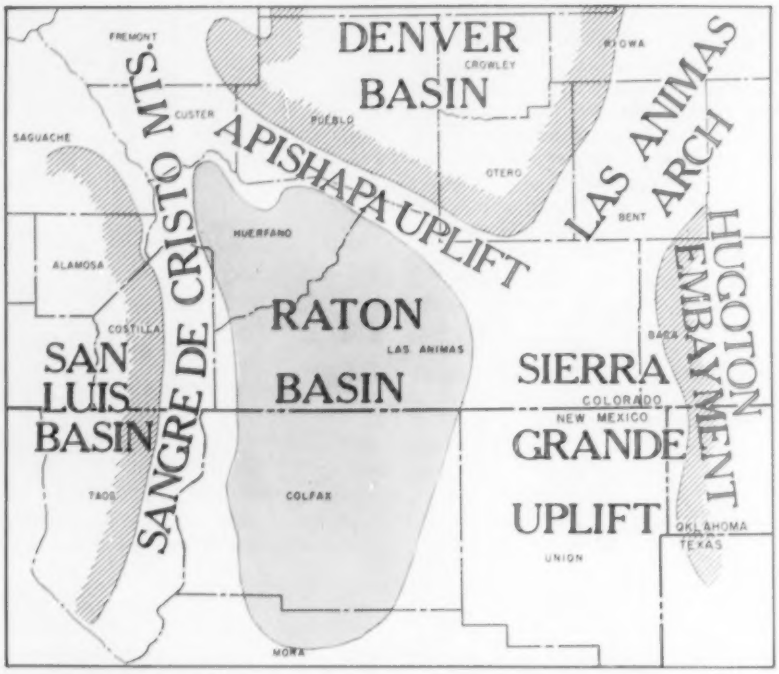


CLOCKWISE ROTATION of the handwheel at left results in automatic valve operation for each step in the operating cycle.

The Northern Raton Basin

. . . an exploratory frontier

by Jerome A. Lewis



INDEX MAP of South-Central Colorado and Northeast New Mexico. Fig. 1.

The northern Raton basin has all the earmarks of an oil province . . . a thick section of marine sediments, known surface anticlines, excellent possibilities for stratigraphic traps, and noncommercial shows of oil and gas.

WITHIN the northern Raton basin are abundant and interesting possibilities for petroleum exploration. It remains today one of the few major unproductive basins in the Rocky Mountain region, yet the essentials for major oil and gas accumulations are quite evident.

There has been intermittent activity in the area since 1887, when the first oil and gas lease was recorded in Huerfano County, Colorado, and present interest now seems to be heading for a high point in exploration. New information resulting from this recent activity plus a reevaluation of the basic geology indicates that this is an exploratory frontier with a very sizable potential.

Structural Conditions

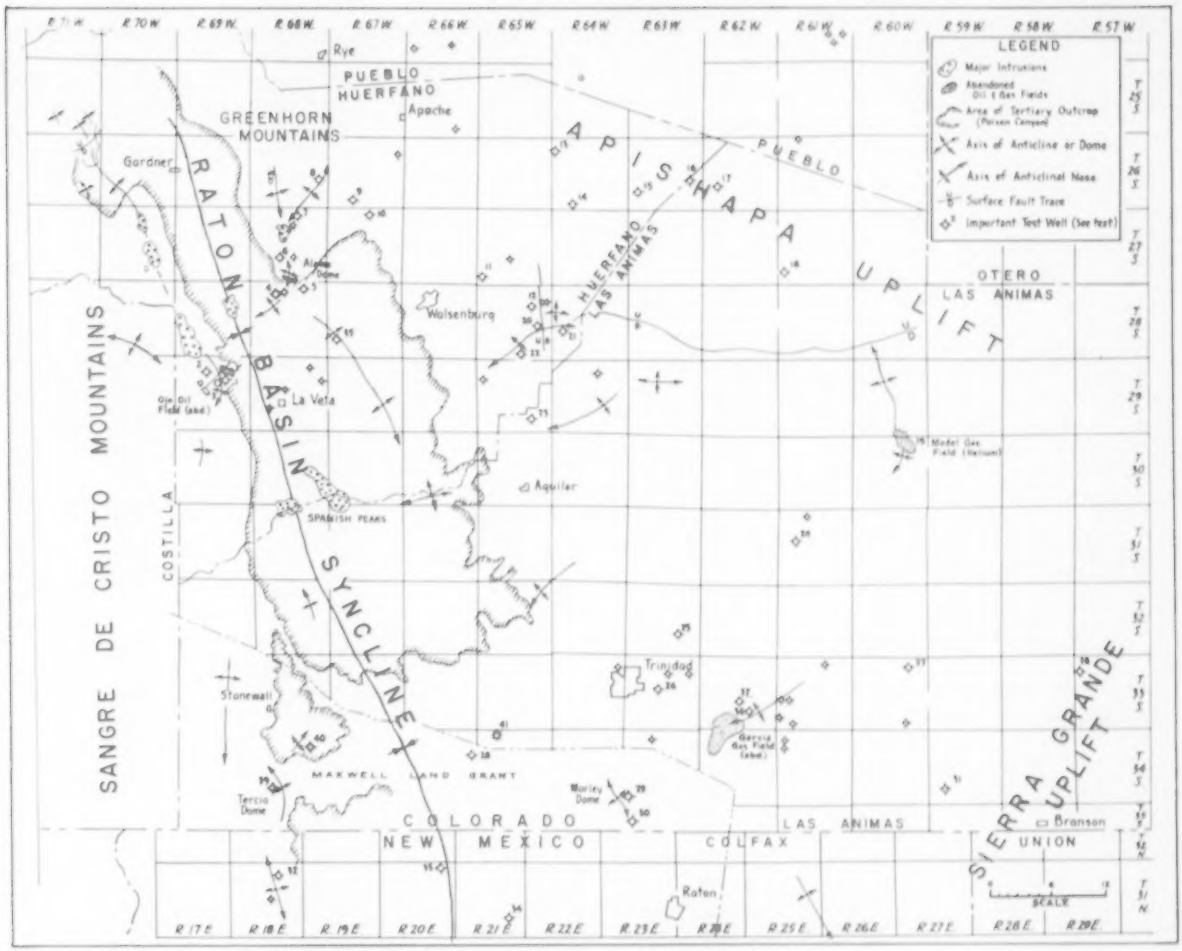
The present synclinal basin is strongly asymmetric (Fig. 3) with a steep to overturned west flank. It is approximately 6,000 sq. miles in area, lying almost entirely within Huerfano and Las Animas counties, Colorado, and Colfax County, New Mexico.

The Greenhorn, Apishapa, and Sierra Grande uplifts which form the north and east flanks of the basin have been positive elements throughout most of geologic time. In Pennsylvanian time high areas similar to these three uplifts bordered a narrow north-south structural and depositional trough. This Central Colorado trough extended in a north-south direction through the area now covered by the extreme western Raton basin flank and the present Sangre de Cristo Mountains. It existed until the close of the Pennsylvanian period.

Subsequent basin tectonics began to form the present Sangre de Cristo Mountains and the adjacent Raton basin during the Laramide orogeny. Present-day structural features are primarily a result of these movements which occurred intermittently from the close of Cretaceous through Eocene time. Strong horizontal forces from the west were involved in this mountain-making process. In Colorado, the old Apishapa-Greenhorn positive area restricted this horizontal movement and considerable structural relief was developed. Due to this buttressing effect, oil-field types of anticlines are evident in the northern Raton basin. Conversely, in New Mexico, the Sierra Grande positive area was further removed from these tectonic forces and only minor folding resulted. Two major structural alignments were developed during these various periods of Cretaceous and Tertiary folding (Fig. 2); one parallels the Sangre de Cristo and Greenhorn mountains, and the other is normal to the Apishapa uplift. The north rim of the basin has been altered by the large southward plunging anticline leading off the Greenhorn Mountains.

In Huerfano County, a major unconformity exists at the base of the Paleocene-Poison Canyon formation, which illustrates locally that many of the features in this area are results of more than one period of folding. The principal periods of folding occurred at the close of Cretaceous time and later during Eocene time. Many of the low-relief structural features found in the area of Tertiary cover should therefore be accentuated in the older rocks.

Tertiary igneous activity was widespread in the northern Raton basin, and occurred predominately during late Eocene time. The intrusions appear to have followed preexisting lines of late Cretaceous and Eocene structure, and in most cases only minor structural changes resulted. There are some examples of structures formed by igneous intrusions; in the great majority of structures tested, however, normal sedimentary sections have been drilled. Ob-



GEOLOGIC MAP of northern Raton basin. Fig. 2.

servations show that metamorphism by the intrusives is surprisingly minor. The beds found adjacent to sizable intrusions are usually affected only a few feet distant.

Stratigraphy and Depositional History

Of primary importance to petroleum exploration is the presence of favorable reservoir rocks within the basin. Throughout the section (Figs. 3 and 4) at least 12 possible reservoir sands exist in the following formations: Raton (multiple sands), Vermejo (multiple sands), Trinidad, Pierre, Apishapa, Codell, Dakota, Morrison-Wannakah, Entrada, Glorieta, Yeso (multiple sands), and Sangre de Cristo (multiple sands). An estimated thickness of from 500 to 1,000 ft. of porous sand should be encountered in drilling the entire section. Of these beds probably the Trinidad, Dakota, Entrada, Glorieta, and Sangre de Cristo are most attractive from the standpoints of continuity, extent, and porosity.

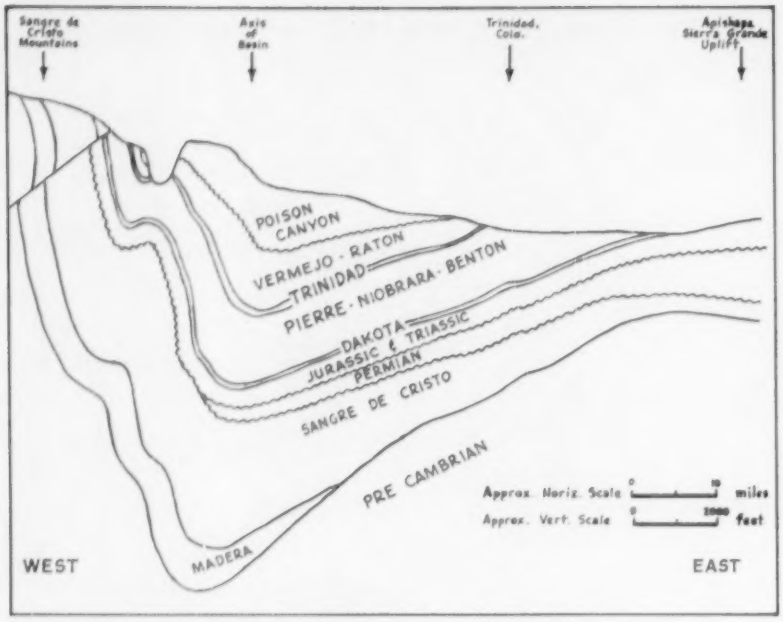
Shows or seeps of oil or gas have been found in all the above 12 horizons except the Glorieta and Yeso. Gas and oil shows have occurred in these formations in the New Mexico portion of the basin. This fact, together with the marine conditions occurring throughout the section, suggests ample source beds for petroleum.

Pennsylvanian . . . Deposition in the basin evidently began during Pennsylvanian (Des Moines) time. Within the north-south trough located near the present Sangre de Cristo Mountains, the thick marine Madera formation was deposited; it consists of gray, fossiliferous limestones, dark gray to black shales, and fine-grained sandstones with minor amounts of arkose. Thicknesses in excess of 2,000 ft. have been measured on the outcrop. This deposition was restricted to the narrow Pennsylvanian geosyncline as indicated by the absence of Madera beds 35 miles east of the outcrop.

In later Pennsylvanian time (Virgil and Missouri) the seas within the trough began receiving large amounts of arkose and coarse clastics from the ancestral Uncompahgre highland to the west. This unusual type of clastic marine sedimentation resulted in the Sangre de Cristo formation which is com-

THE AUTHOR

Jerome A. Lewis is in Denver as manager of Rocky Mountain operations for Lewis Drilling Co. and Lewis Brothers, Inc. He did undergraduate and graduate geological work at University of Colorado and University of Oklahoma and received a bachelor's degree in geological engineering at O. U. in 1950. He was employed a short while for Shell Oil Co. in Oklahoma City and Pueblo, Colo., and moved to Wichita during 1951 where he worked in Kansas as a partner in Lewis Drilling Co. Later Lewis lived in Walsenburg and managed the company's exploration activities in the Raton basin until 1955. He is currently trip coordinator for the coming 1956 Rocky Mountain Association of Geologists' field trip in the Raton basin and adjoining areas.



DIAGRAMMATIC structural cross-section. Fig. 3.

posed of red shales interbedded with very calcareous sandstones. The sandstones vary from red and arkosic to white and fine-grained or silty. Thin gray and red limestones, in part arkosic, are common throughout the section; some marine fossil fragments have been reported. The trough area during Sangre de Cristo time was more widespread than in prior Madera time; however, pronounced regional thinning within the Sangre de Cristo formation occurred toward the bordering uplifts to the east (Figs. 3 and 4). Present thickness varies from 6,000 ft. in western Las Animas County to 100 ft. on the Apishapa uplift in Huerfano County.

Permian . . . At the close of Pennsylvanian time broad regional uplifting or tilting occurred west of the Pennsylvanian trough. Most of the trough was raised above depositional level and Permian sediments were not deposited. The western edge of Permian sediments, which onlapped this ancient positive area, is located near the axis of the present basin.

Three Permian formations can be recognized within the northern Raton basin. The Yeso consists of red dolomitic sandstones and shales with thin dolomite stringers. It thins from approximately 400 ft. in central Las Animas County to zero westward. The Glorieta is a homogeneous, medium-grained, white to orange, porous, siliceous sandstone which thins westward from 300 ft. to zero. The upper Permian beds are red anhydritic sandstones and shales, thinning from 500 ft. to zero.

Triassic and Jurassic . . . The beginning of Triassic time was marked by the deposition of the Santa Rosa cherty conglomerate which is approximately 50 ft. in thickness. This marker probably indicates the existence of a regional unconformity between the Triassic and Permian periods. Throughout the Triassic and Jurassic periods very few regional deposition changes occurred within the northern Raton basin. Continental and shallow-water sediments were deposited, overlying the Santa Rosa in the following sequence: the Chinle formation (Triassic), 250 ft., composed of red shales and siltstone with limestone nodules; Entrada sandstone (Jurassic), 50 ft. thick, generally white, porous, and medium grained; Wannakah formation (Jurassic), 100 ft. thick, an evaporitic section with interbedded sandstones, thin limestones, and shale; and the Morrison formation (Jurassic), 300 ft. in thickness, consisting of its typical variegated shales with some limestone and sandstone beds. These formations are generally present throughout the basin area.

Cretaceous . . . The Morrison is overlain by a conglomeratic sandstone in the Cretaceous-Dakota series, indicating a probable interruption in deposition at the close of Jurassic time. The Dakota series further includes one or more massive sands separated by black shales, and reaches an over-all thickness of 150 to 200 ft. Porous sandstones are common throughout the series, but limited subsurface control, at present, prevents definite correlation of sandstone beds.

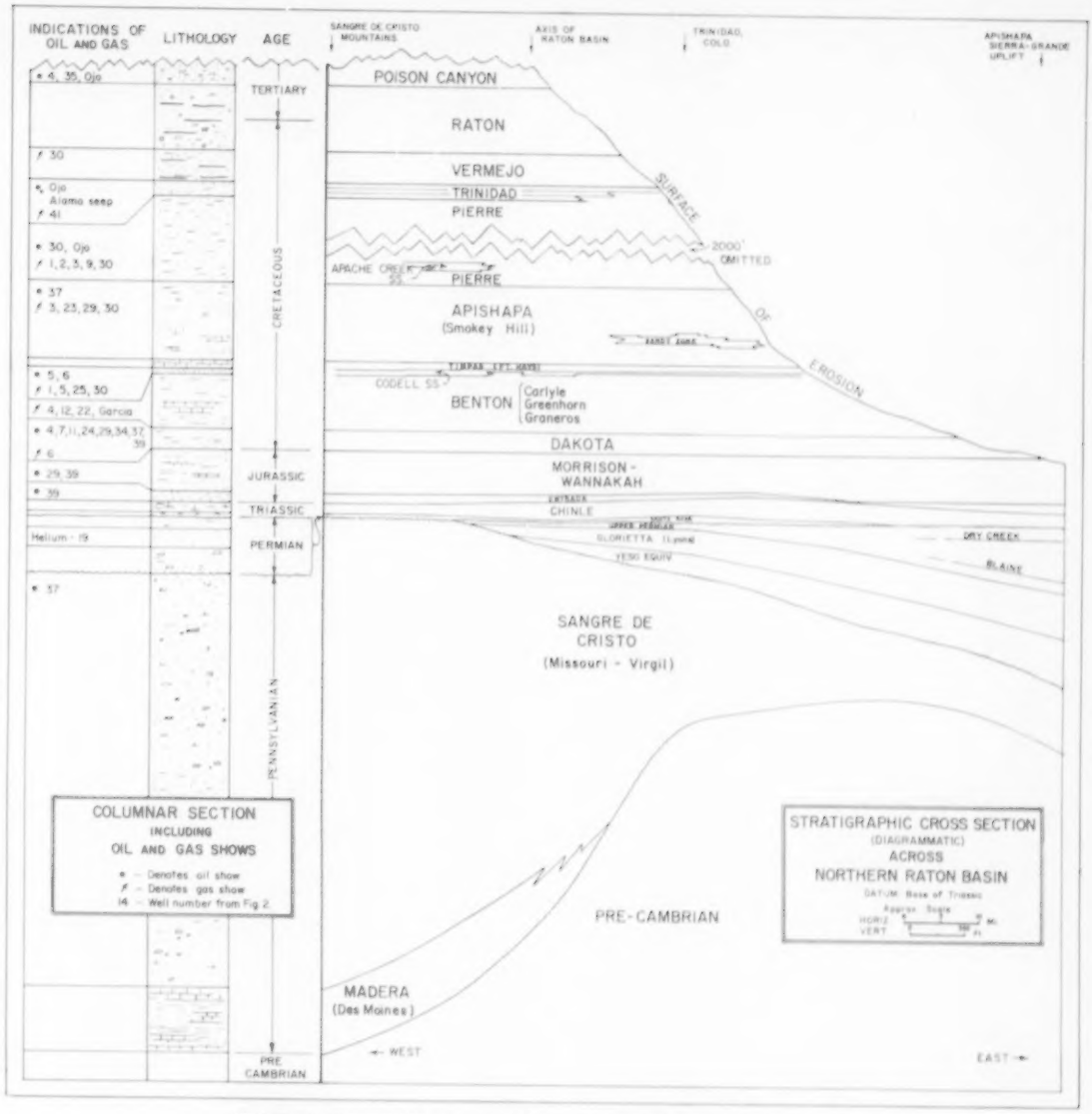
Approximately 4,000 ft. of marine Upper Cretaceous sediments were deposited above the Dakota series. These beds consist of dark gray to black shales, gray fossiliferous limestones, and numerous lenticular sand zones. Recognizable horizons are the Graneros shale, Greenhorn limestone, Carlyle shale, Codell sandstone, Timpas (Fort Hays) limestone, Apishapa (Smoky Hill) shale, and Pierre shale.

Widespread gradual uplift near the end of Pierre time resulted in the gradational change from shale to a beach deposit represented by the Trinidad sandstone. On the west flank of the basin the Trinidad is composed of three individual sandstone members each 100 ft. thick. Across the basin two of these members are absent, probably through a gradual change to shale, indicating at least three fluctuations in this shore line.

Swamp and lagoonal deposition followed the retreat of the sea and the interbedded sandstones, shales, and coals of the Vermejo and Raton formations were laid down. The thickness of the Vermejo varies from 400 ft. in Huerfano County to zero where it is overlapped by the younger Tertiary beds. It is present over approximately 2,400 sq. miles in the central and western portion of the basin; however, its definite extent is obscured by the overlapping. Likewise, the Raton formation has been overlapped by Tertiary rocks. The Raton covers an area of approximately 2,000 sq. miles and has a maximum thickness in excess of 1,500 ft.

Tertiary . . . The base of Tertiary (Paleocene) rocks is placed within the Raton formation. These Raton beds interfinger with the Paleocene-Poison Canyon formation, in the southern portion of the area. In northern Las Animas and Huerfano counties, however, this interfingering grades into a marked unconformity at the base of the Poison Canyon indicating a period of Paleocene uplift and erosion. In this area Poison Canyon beds overlap truncated older formations down to the Apishapa (Smoky Hill) shale. Lithologically the Poison Canyon is composed predominately of buff and gray green, shaly sandstones and conglomerates with interbedded yellow, green, and lavender shales. Maximum thickness is approximately 2,000 ft. The areal extent of the Poison Canyon formation is shown on Fig. 2. Along the basin flanks, it is also truncated and overlapped by the Eocene, Cuchara, and Huerfano formations.

Eocene time was a period of intermittent structural movements which caused several unconformities within the sedimentary section. The rapidly rising Sangre de Cristo Mountains fur-



SEVERAL HORIZONS are potential pay zones in the Raton basin. Fig. 4.

nished red, clastic source material for both the Cuchara formation and the unconformably-overlying Huerfano formation. These units are restricted to an area of 250 sq. miles near the Spanish Peaks and in Huerfano Park. They are not shown on the accompanying cross-sections.

Additional folding and faulting followed in late Eocene time and igneous material was intruded into the sediments. Younger Tertiary sediments were subsequently laid down unconformably upon the older rocks. Some of these late Tertiary beds are preserved today in the northermost portion of the basin, Huerfano Park.

Indications of Oil and Gas

Oil and gas shows have been encountered in wells drilled throughout the Raton basin. Sizable seeps have also been reported. Important tests are shown numbered on Fig. 2. The most significant shows of oil and gas in these test wells are tabulated in the columnar section (Fig. 4) adjacent to the formation in which they occurred. Practically all horizons have furnished shows except the Permian beds which have contained reported oil seeps and shows in New Mexico.

Subcommercial production has actually been found on two local features: the Ojo anticline and the Garcia anticline. At Ojo, 29s-69w, the Trinidad sandstone forms flank escarpments which border Pierre shale outcropping in the center of the structure. Unconformable Poison Canyon beds partially overlap both the Trinidad escarpment and the overlying Vermejo and Raton rocks. On the east flank, two wells produced a few hundred barrels of oil from the truncated Trinidad sandstone at approximately 500 ft. At least four other shallow wells bailed small quantitives of oil from sands in the Pierre, Vermejo, Raton, or Poison Canyon formations. It is still possible to bail oil from another of the shallow wells in this vicinity. Several authors have described a sizable oil seep on the west flank of the structure. Apparently it has been destroyed by highway construction. It occurred near a major thrust fault where Cretaceous rocks are in contact with Pennsylvanian rocks. The first well was drilled near the axis of the structure (Well 1) in 1924. Gas tests from this well were reported in excess of 2,000 M.c.f. per day, more than likely from the Fort Hays-Carlyle

section. Gas from well was used for a few years in later drilling operations.

On the southwest flank of the Garcia anticline, 34s-62w, approximately 12 wells produced very rich gas from fractures in the Carlyle and Graneros shales. A natural-gasoline plant operated here during the 1920's to process the gas, which yielded approximately 3 gal. of gasoline per M.c.f. Nearby ranches still use gas produced from some of these wells. Two deep tests have been drilled on the Garcia anticline. In Lewis-Sullivan 1 Dutto (Well 37) a show of oil was found in the Sangre de Cristo formation. Throughout an interval of 150 ft., drill-stem-test recoveries ranged from 10 to 75 ft. of oil-cut mud, and bottom-hole pressures exceeded 1,000 psi. In Well 36, the comparable Sangre de Cristo interval had no porous zones.

Eight test wells have been drilled along the line of folding south of the Greenhorn Mountains. At Alamo Dome, oil saturation was present in impermeable cores of the Codell sandstone (Wells 4, 5, and 6). In Well 7 this sand is porous and water bearing. Saturation was also cored in the lower member of the Dakota sandstone in Well 4. No accurate test was made of this oil show because of collapsed production casing. Other shows of oil and gas have been found in the Dakota section Wells 6 and 7. In the Alamo mine, 35-27s-68w, oil seeped from fractures in the Trinidad sandstone and Pierre shale. This oil was used for years in lubricating mine equipment.

Oil staining is present in samples of Skelly 1 C.F.I. at Tercio Dome, 34s-68w, (Well 39); various shows are indicated in the Dakota, Morrison, Wannakah, and Entrada formations.

In Stanolind 2 C.F.I., (Well 29) at Morley Dome, noncommercial shows were found in sands within the Apishapa, lower Dakota, and Wannakah formations. A test of the Apishapa recovered 20 ft. of gas-cut mud; 740 ft. of water was recovered from the Dakota sandstone.

The most encouraging Dakota oil show in the Raton basin was tested in the Conoco 4 St. Louis in 27-29n-22e, Colfax County, New Mexico (not shown on map). Saturated Dakota sand was tested through casing and fractured. It produced approximately 4 bbl. of oil plus 8 bbl. of water per day before abandonment. Other Conoco wells had similar oil shows in core but completion was not attempted.

Prospective Traps

Structural prospects . . . Exploratory drilling within the northern Raton basin has tested only a few of the obvious structures and many of these still lack complete evaluation. Fig. 2 shows the location of all known wells drilled. Some 32 of these wells were drilled on known structural prospects; however, only 10 reached pre-Cambrian rocks. Any of the previously mentioned possible reservoir beds offer good prospects for deeper drilling on these structural features. In some of the tests, minor amounts of oil or gas were reported which might be developed commercially with present fracturing techniques, mud programs, formation logging, and other completion practices.

Undoubtedly many sizable structural features in the northern Raton basin remain to be discovered. Limited mapping programs during the past few years have demonstrated that prospective structural traps may logically be found by use of the normal exploratory methods. Recent exploration has further defined the known features and has resulted in the discovery of several previously unmapped prospects, some of which are shown in Fig. 2. Structural relief is usually sufficient to allow effective use of photogeology and surface mapping throughout the area. Because of sand lenticularity and the complications of unconformities, Tertiary formations are best suited for reconnaissance mapping. Mapping of Cretaceous outcrops should give accurate indication of deeper structure.

Seismic programs conducted in both Colorado and New Mexico indicate that this is the most valuable geophysical tool for mapping structure. Fair to good reflections can usually be mapped from several horizons. In some cases the absence of a reflection has been attributed to an intrusion; however, this has presented no great problem since adjacent records were generally good. Terrain and drilling conditions result in average Rocky Mountain seismic-crew costs.

Other geophysical methods are affected even more adversely by the igneous material, but gravimeter work has shown that this tool is of some value in reconnaissance mapping.

Core drilling may be used to advantage to define structure where correlatable Cretaceous horizons can be reached at economic depths.

Stratigraphic prospects . . . Many formational changes occur within the northern Raton basin which present a generous number of stratigraphic possibilities. The accompanying cross-sec-

TABLE 1—IMPORTANT WELLS IN THE NORTHERN RATON BASIN

COLORADO

No. from Figs. 2 and 4	Name and location—	Total depth (ft.)	Formation at total depth
1	Panuco 1 Andreoli, 10-29s-69w	3,365	Carlyle?
2	Lewis 1 Campbell, 4-29s-69w	4,630	Carlyle
3	Cabeen 1 Andreoli, 10-29s-69w	Drlg.	
4	Parker 1 Kinney Coastal, 4-28s-68w	4,120	Dakota
5	Lewis 1 Major, 2-28s-68w	5,895	Dakota?
6	Mid-Alamo 1 Pressey-Klein, 28-27s-68w	2,559	Dakota
7	Pressey 2 Alamo, 3-27s-68w	1,900	Dakota
8	Kinney Coastal-Texas 1 Pino, 24-26s-68w	2,175	Pre-Cambrian
9	Unknown, 33-26s-67w	1,700?	Pierre?
10	Pressey 1 Pressey, 3-27s-67w	1,350?	Dakota
11	Allen-Hill 1 Abeyta, 31-27s-65w	2,237	Morrison
12	Rainbow 1 Capps, 12-28s-65w	306	Graneros?
13	Skelly 1 Niebuhr, 6-26s-64w	915	Pre-Cambrian
14	Skelly 1 Shafer, 32-26s-64w	851	Pre-Cambrian
15	Skelly 1 Busch, 30-26s-63w	1,229	Pre-Cambrian
16	Skelly 1 Pressey, 24-26s-63w	1,371	Pre-Cambrian
17	Skelly 1 Weiland, 19-26s-62w	1,495	Pre-Cambrian
18	Skelly 1 Jolly, 30-27s-61w	1,941	Pre-Cambrian
19	Model Oil 2 Government, 11-30s-60w	2,010	Sangre de Cristo?
20	Smith 1 Saliba, 23-28s-65w	Drlg.	
21	Hendershot 1 Hendershot, 19-28s-64w	850	Triassic?
22	D & R F 1 Rouse, 34-28s-65w	2,058	Yeso?
23	Huerfano 1 Stewart, 26-29s-65w	2,103	Upper Permian?
24	McLaughlin 1 Anderson, 17-31s-61w	1,610	Glorieta?
25	Trinidad 1 Flontz, 23-32s-63w	2,960	Glorieta?
26	Johnson-Sullivan 1 McCarty, 16-33s-63w	5,438	Sangre de Cristo
27	Taylor-Sullivan 2 LeSage, 2-33s-60w	2,495	Pre-Cambrian
28	Continental 1 C F & I, 12-34s-66w	6,099	Sangre de Cristo
29	Stanolind 1 C F & I, 31-34s-63w	6,918	Pre-Cambrian
30	C F & I 1 C F & I, 7-35s-63w	3,729	Dakota
31	Taylor-Sullivan 1 Mock, 29-34s-59w	3,455	Pre-Cambrian
35	Jewett 1 Valdez, 30-28s-67w	450	Poison Canyon?
36	Forest 1 Cortese, 26-33s-62w	3,456	Sangre de Cristo
37	Lewis-Sullivan 1 Dutto, 27-33s-62w	3,605	Sangre de Cristo
38	Pauley-Sullivan 1 Waldroup, 7-33s-57w	2,895	Pre-Cambrian
39	Skelly 1 C F & I, 29-34s-68w	7,457	Sangre de Cristo
40	Continental 2 C F & I, 11-34s-68w	6,543	Morrison
41	C F & I 1 Fredrick Mine, 4-34s-65w	(?)	Trinidad?

NEW MEXICO

32	Union 1 Bartlett, 23-31n-18e	4,410	Igneous
33	Continental 7 St. Louis, 2-31n-20e	6,081	Morrison
34	Continental 2 St. Louis, 26-31n-21e	7,268	Pre-Cambrian

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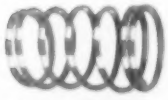

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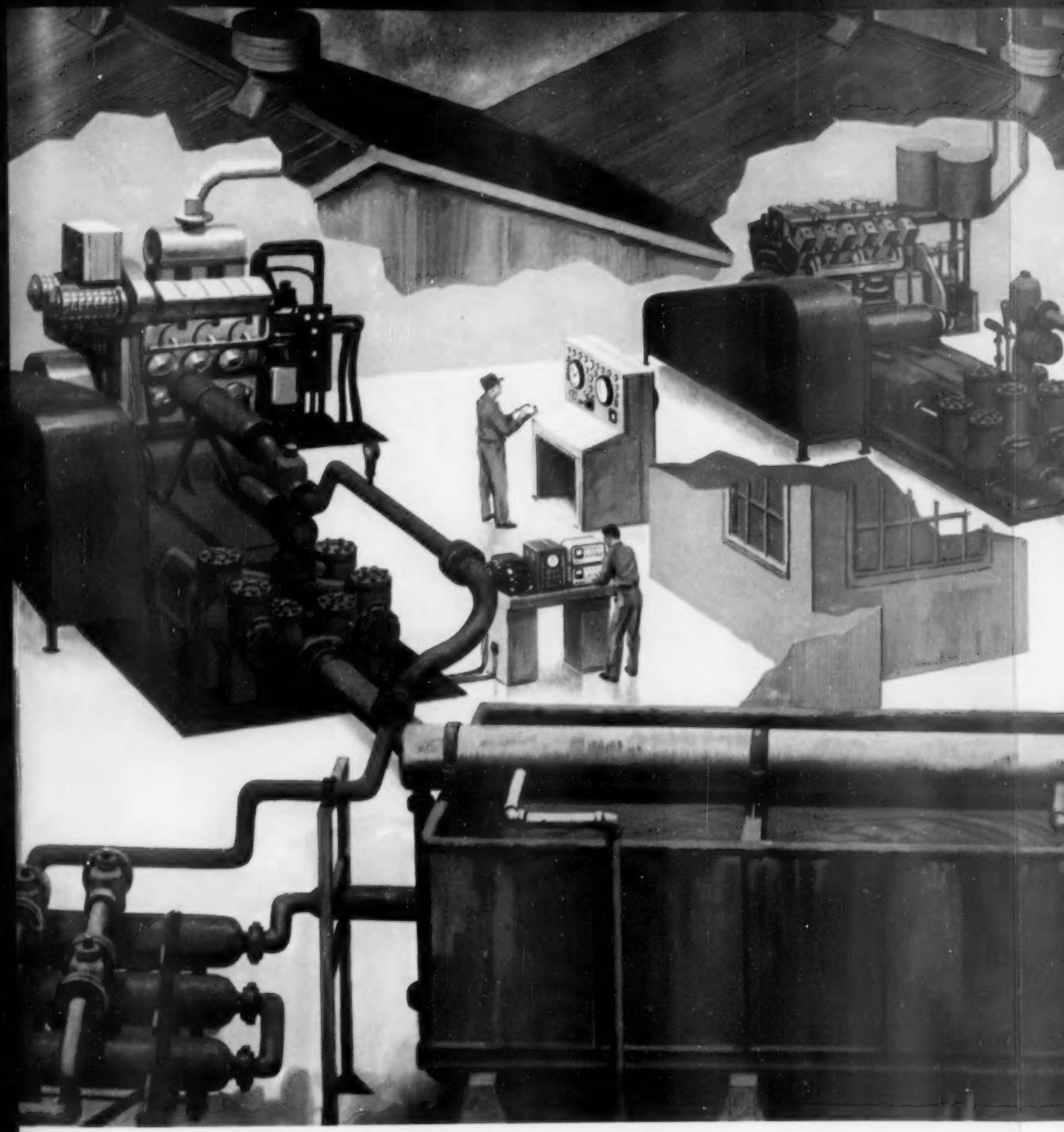

n Has a Fully Instrumented Test Pump "Lab

acturer has such an advanced Mission main plant are fitted test instruments including a oscillograph described on the reverse side of this advertisement. Here, Mission research men conduct tests using a variety of contaminated or sand laden muds at temperatures that average 155° F. and pressures that often exceed 2,000 psi. Without these test pump facilities, it wo such products a has been proved

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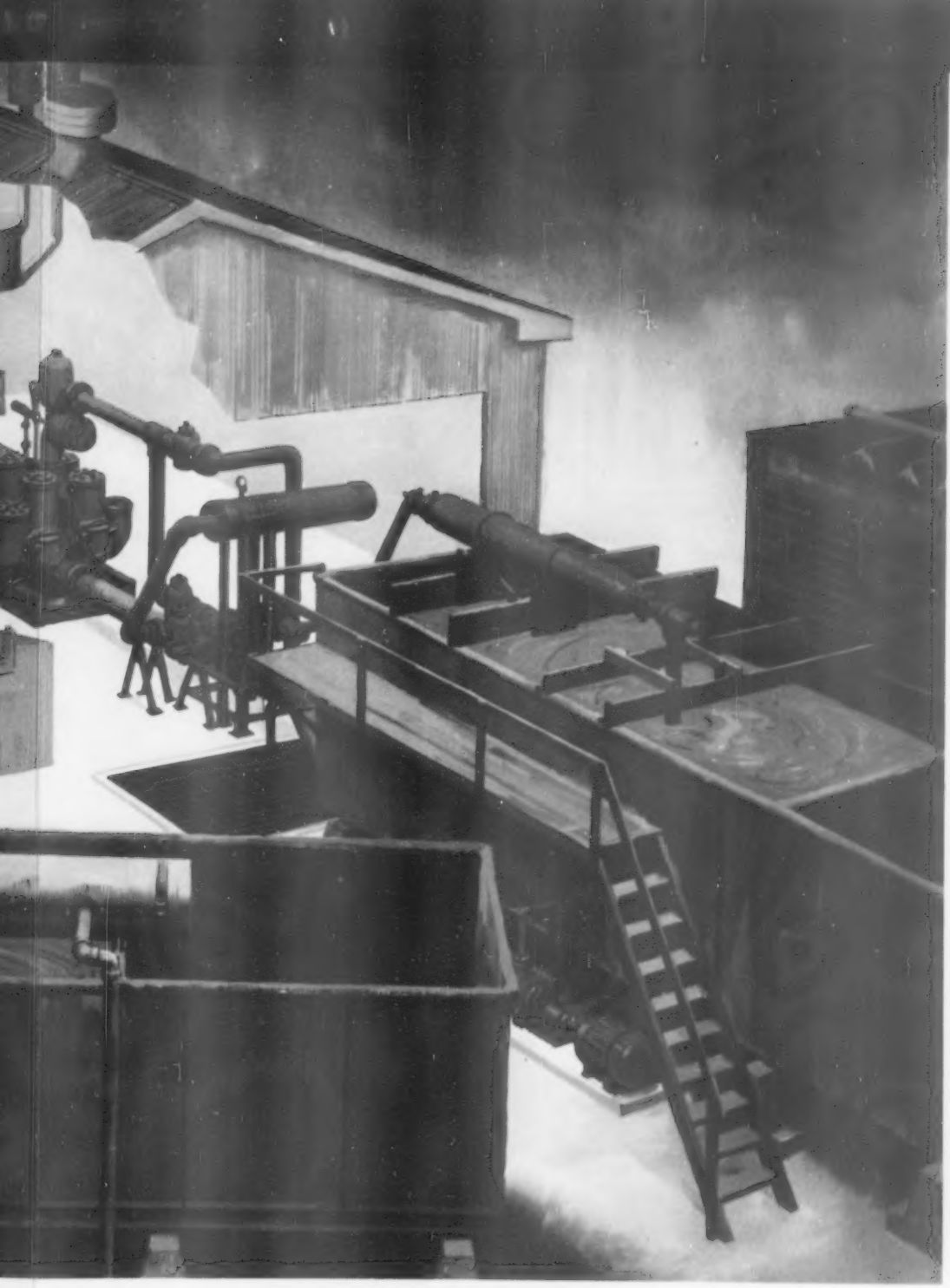

Test Pump News From Mission

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Mission Installs Electronic Instr

Mission Engineers are using advanced instrumentation techniques to disco

these facts, they will be able to make tomorrow's pump parts even better

The electronic test pump instrumentation described on these pages is the latest step in a research program which began with the installation of the first Mission test pump nearly twenty years ago. This program has already resulted in many important improvements in pump parts and it is expected that even more important improvements will result from the current phase of a continuing program.

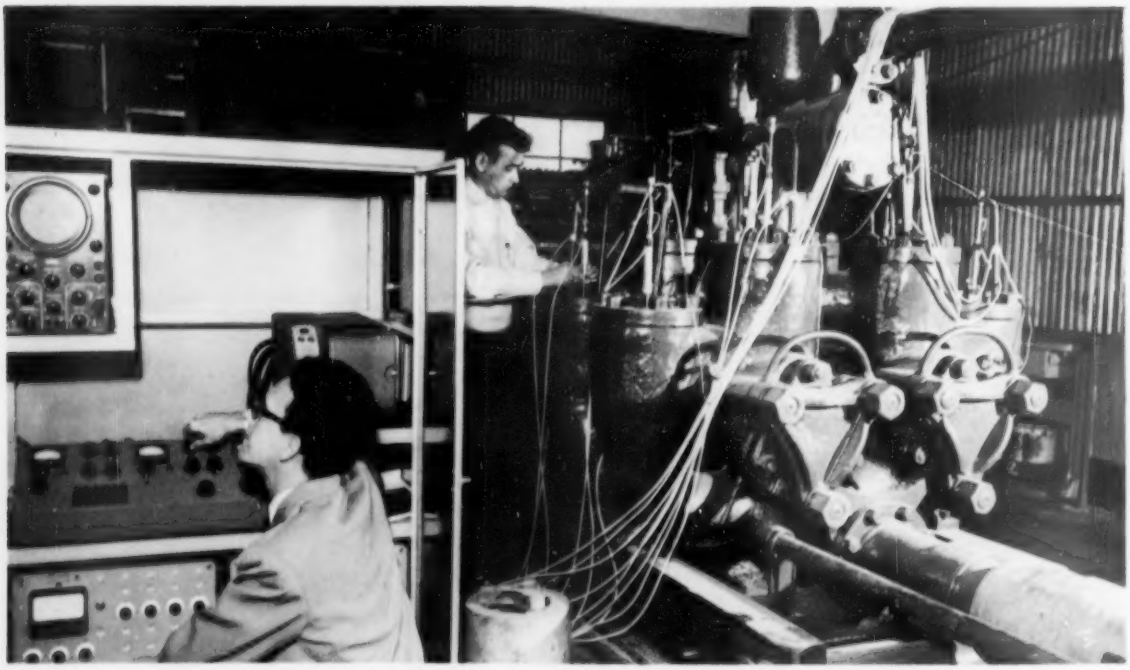
The electronic instrumentation consists of a fourteen channel recording oscillograph fed by a number of appropriate pickups mounted at strategic locations on the fluid end of any of the test slush pumps operated by Mission. In many respects, this instrumentation is similar to the Electrocardiograph that doctors use to study the action of the human heart.

This comparison is especially appropriate since the slush pump is literally the heart of a drilling rig.

Mission Engineers have discovered some hitherto unknown facts about the action of pump parts. An understanding of these facts is making possible important improvements in pump parts design.

In addition to the study of pump parts action by means of the oscillograph, Mission is continuing the program of 24 hour-a-day

Signals from the various pickups on the pump are fed to the amplifiers in the instrument cabinet shown on the left foreground.



nstrumentation on Test Pumps

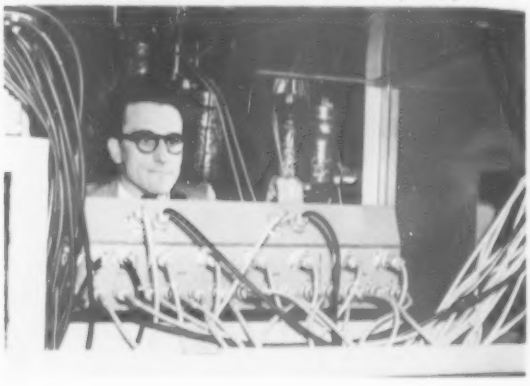
to discover hitherto unknown facts about pump parts performance. With
n better than the outstanding products being produced by Mission today.

endurance testing. A variety of contaminated or sand-laden muds from actual drilling locations are used for these tests. Mud properties are rigidly controlled to simulate any field conditions encountered. Discharge pressures often exceed 2000 psi.

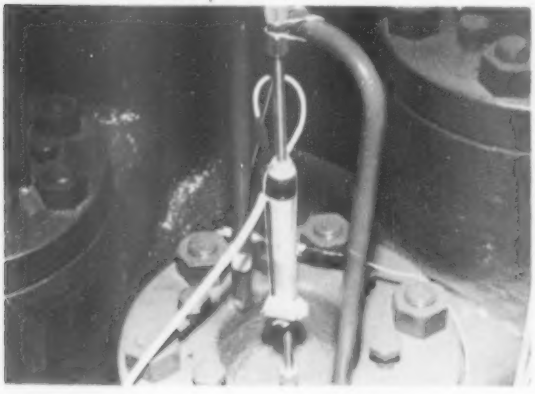
With these complete research and testing facilities, Mission Engineers are making improvements in pump parts that would not be possible otherwise. Tests that definitely confirm the superiority of Mission products put real meaning in the slogan "Nothing but the finest will bear the name of Mission."

This instrument cabinet contains the fourteen channel recording oscillograph (center right) with channel amplifiers and a cathode ray oscilloscope. A Mission Research Engineer is making notes regarding the calibration of one of the channels.

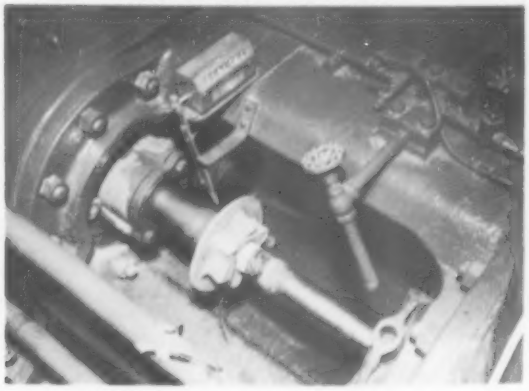
A Mission Research Engineer is shown adjusting the circuit of one of the pick-ups. There is a separate circuit and amplifier channel for each pickup.

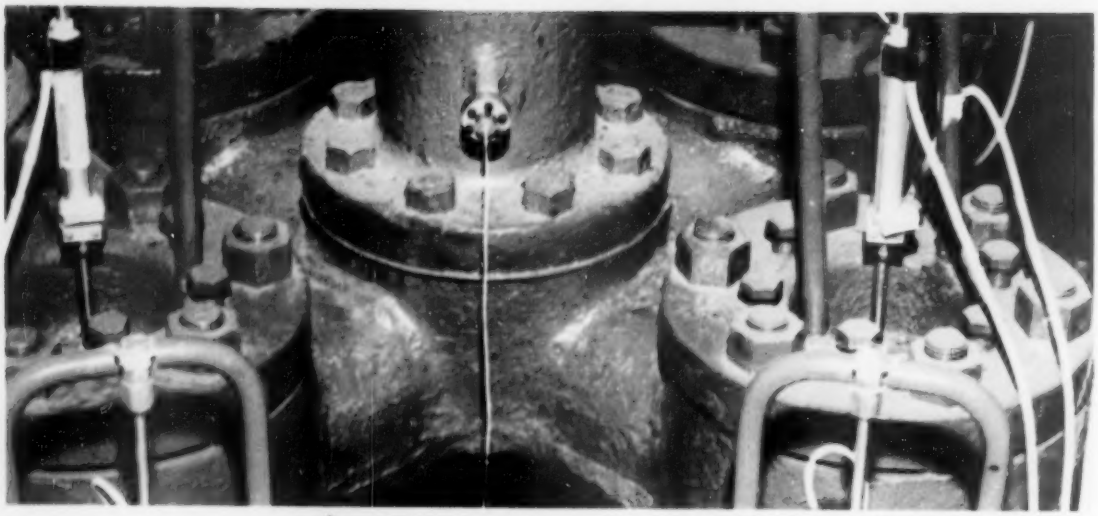


A valve lift pickup, like the one shown here, is mounted on each pot cover. These pickups transmit signals that are recorded as valve motion and timing. From this information, Mission Research Engineers can detect the slightest change of valve position.



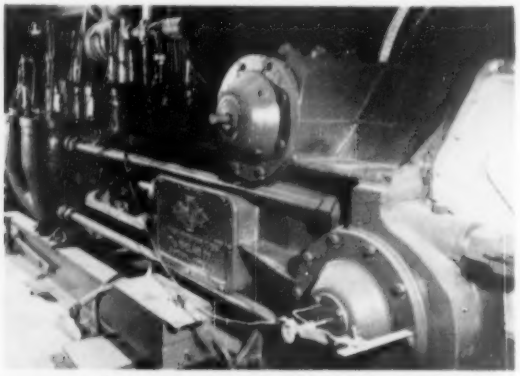
Strain gages are mounted on each rod near the crosshead end to indicate the load on the rod at all times.



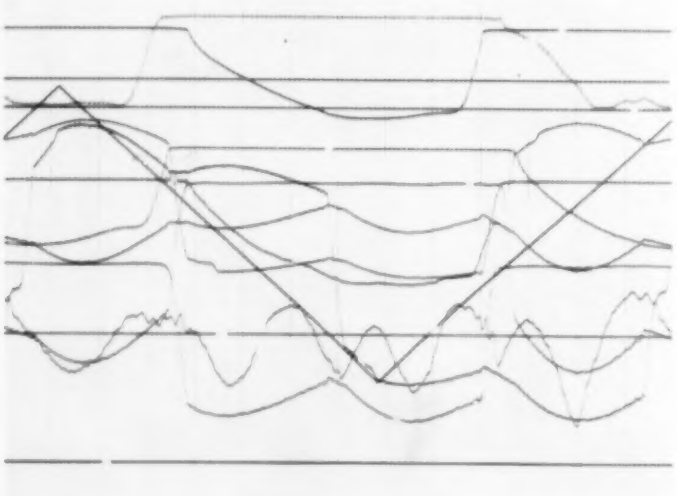


Notice the pressure pickup mounted on the side of the discharge manifold. From this trace, it is possible to determine the relationship between discharge pressure and the operating parts of the pump.

Pressure pickups, like the one shown here, are mounted on the end of each cylinder. These units, plus similar pick-ups on suction and discharge manifolds, give Mission Engineers complete information on instantaneous pressures at all times.



This linear potentiometer mounted on the end of the crankshaft transmits a signal that gives the position of the crank at all times. From this trace, Mission engineers can determine the exact position of the piston at any instant.



This trace from the oscillograph gives Mission Research Engineers detailed information on the action of all Mission fluid end parts under actual operating conditions. From such traces, valuable new facts concerning pump parts and pump operation are being obtained. These facts are making possible the development of even better pump parts.

tions (Figs. 3 and 4) illustrate some of these possibilities.

Porous sand lenses within the Poison Canyon formation offer some stratigraphic-trap prospects. Oil shows have been found in these sands where Poison Canyon beds overlie truncated marine Cretaceous shales. Source beds are generally lacking elsewhere. Other trap possibilities exist where porous sands of the Raton and Vermejo formations are truncated and overlain by the Poison Canyon beds. In this case, the pre-Poison Canyon unconformity may furnish both the trap and the necessary association with source beds. This condition has resulted in minor oil accumulation in Raton, Vermejo, and Poison Canyon beds on the east flank of the Ojo anticline in Huerfano County.

The Trinidad sandstone offers two attractive stratigraphic possibilities in addition to structural prospects. (1) Pre-Tertiary erosion truncated the Trinidad locally and regionally in similar manner to the aforementioned Vermejo and Raton beds. Sizable truncation traps may exist in Huerfano County near Alamo Dome and in Huerfano Park where Tertiary rocks overlap the Trinidad along the basin flanks. (2) On the western flank of the basin, near Ojo, the Trinidad formation is comprised of three massive members, each approximately 100 ft. thick. Eastward across the basin two of these members are absent. This condition is illustrated in maps published recently by the United States Geological Survey covering the Trinidad outcrop on the eastern flank. Sand tongues apparently "split off" from the base of the Trinidad and subsequently wedge out in a north of northeast direction. Good stratigraphic possibilities exist if these strand lines can be delineated.

As is generally true throughout the Rocky Mountains, the Cretaceous shales contain many porous lenticular sands. These sands have been encountered in test wells within the Pierre, Apishapa, and Carlyle sections, many times with oil and gas shows (Fig. 4). Porosity is indicated in other wells where sand lenses have been water bearing. Prospects for accumulation also exist in fractured Cretaceous shales. Shale production has been found both at Garcia anticline and in Florence field in Fremont County to the north.

The Codell sandstone is particularly interesting near Alamo Dome. In at least four wells it has contained fair oil shows where low permeabilities were found, while in other wells and at the outcrop, it is a porous sand.

In Figs. 3 and 4 a regional change is illustrated in the Glorieta (Lyons) sandstone. The sand thins to the west in the subsurface and is absent in the Sangre de Cristo Mountains and the Greenhorn Mountains, apparently due to an onlap relationship. An updip pinchout of the Glorieta sand should exist west of the basin axis. This condition certainly offers potentialities of a sizable trap coupled with an excellent reservoir sand.

The Sangre de Cristo (Pennsylvanian) has probably created more recent interest in stratigraphic possibilities than any other formation. The diagrammatic cross-sections show clearly the pronounced regional thinning of this section. As the section thins eastward, many of the individual beds become thinner and eventually disappear. This condition is demonstrated in 33s-62w, between Wells 36 and 37. In less than 1 mile, porous, arkosic sand zones grade into shale and siltstone. Stratigraphic changes appear to be ideal for traps in this porous, clastic-marine section which thins regionally eastward. Prospects for stratigraphic tests to the Sangre de Cristo should probably be restricted to an area where a moderately thick section is present (1,000-3,000 ft.).

The most attractive area seems to be on the eastern basin flank in northern Las Animas and southern Huerfano counties near the location of the subsidiary east-west Pennsylvanian trough. When the petroleum possibilities of red sediments are considered, the question of source beds often arises. This problem seems of lesser importance when related to the Sangre de Cristo beds because of: (1) its partial marine deposition, and (2) the presence of the substantial oil shows described previously.

The Madera formation of Des Moines age is a marine carbonate section which has never been penetrated in the subsurface. It completely "wedges out" between the outcrop on the western flank of the basin and the pre-Cambrian tests on the eastern flank (Figs. 3 and 4). In most areas within the basin the depths to reach the Madera appear to be in excess of 7,500 ft. due to the extremely thick overlying Sangre de Cristo and Tertiary beds in the center of the basin.

Drilling Conditions

Drilling costs, conditions, and problems have been extremely variable in the 20 test wells drilled during the past few years. The prospective depths range from 500 to 15,000 ft. or more. There are, however, many prospects within the 3,000 to 8,000-ft. range. Due to variations in depth, formations encountered, and structure, typical drilling conditions cannot be established.

Three main problems have been encountered. (1) Sharply folded structures on the west and north flanks of the basin have resulted in crooked hole difficulties. Modern preventive drilling methods can be used to effectively combat this problem; however, increased costs in these areas should be expected. (2) Lost circulation has been serious in two wells in Las Animas County but is not as widespread as in the southern portion of the Raton basin in New Mexico. Where the Cretaceous shale section is encountered at depths of 3,000 to 6,000 ft. in Las Animas County, lost-circulation problems should probably be expected. Remarkable results have been obtained through use of air drilling through this section. Future drilling programs should undoubtedly consider this method. (3) Slow penetration rates are usually experienced below the Cretaceous section. Tertiary igneous rocks penetrated have not resulted in hard drilling. Other drilling-cost factors such as weather, terrain, water, and supplies are generally better than for normal Rocky Mountain operations.

Conclusions

The northern Raton basin is an area where geologic conditions are generally favorable for oil and gas exploration. The virtually unexplored nature of this area classifies it as a frontier with large potential.

1. The sedimentary section is quite encouraging. Within the Cretaceous, Jurassic, Permian and Pennsylvanian sections there is a composite thickness of from 500 to 1,000 ft. of objective reservoir sands. The best horizons from the standpoint of reservoir characteristics include: Trinidad, some sands within the Pierre and Apishapa, Dakota, Entrada, Glorieta and Sangre de Cristo.

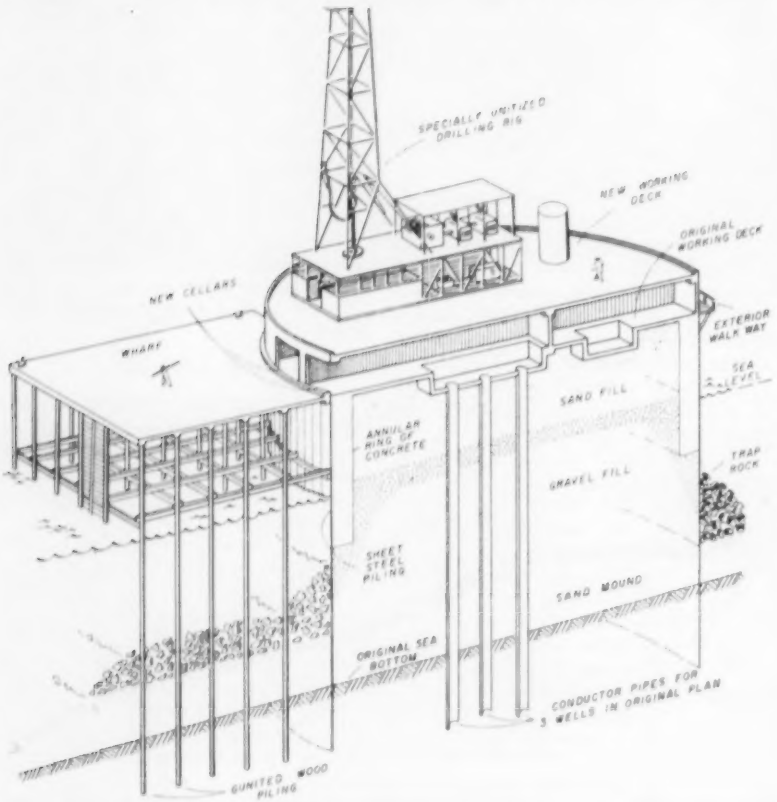
2. Marine and partial marine conditions were present through most periods of deposition; these marine rocks furnished source beds for oil. Numerous oil and gas shows further indicate that this is a petroliferous area.

3. Prospective traps for oil and gas are evident in structures which have considerable relief. Structures were developed during at least two periods of folding. Seismic and surface mapping should locate many additional structures and supplement information on known structures, many of which are not fully evaluated. The igneous intrusions seem to present no problems to exploration that cannot be resolved.

4. Stratigraphic exploration appears most promising in the Trinidad, in lenticular Cretaceous sands, in the Codell, Glorieta, Sangre de Cristo, and the Madera. The Raton, Vermejo, and Trinidad have unconformity trap possibilities.

5. Economic considerations such as depths to objective horizons, drilling costs, and exploration costs are not unreasonable.

70 Wells Will Drill From This Island



DOUBLE-DECKING allows full use of the island, left above. Producing wells are completed on lower level while rig operates on upper deck.

Million-dollar, man-made island in 45-ft. waters may prove to be the most practical type of structure for developing offshore reserves. Chief problem has been to provide cellar space.

by D. H. Stormont
District Editor

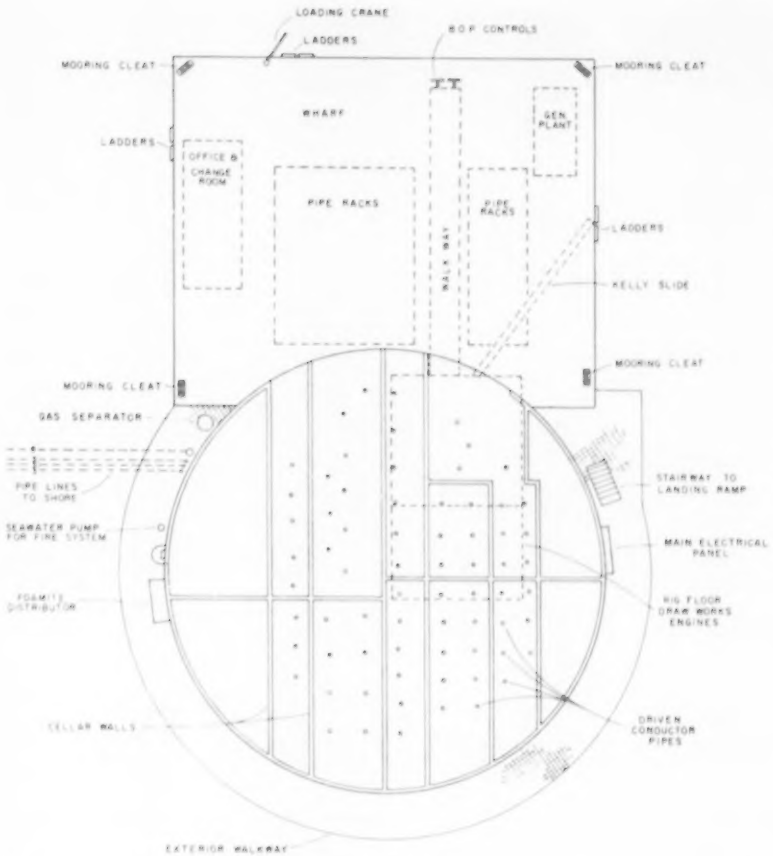
THE 75-ft. circular island Monterey Oil Co. and The Texas Co. erected 1½ miles offshore from Seal Beach is slated to become the industry's most densely drilled area.

Double-decking of the earth-filled structure, now being completed, will provide space for a total of 70 wells. First slant-hole well from the raised portion was completed in mid-March. Previously 10 producers had been drilled from the lower deck.

California's new offshore leasing laws no longer require that drilling be carried out from earth-filled islands, as was the case when the Seal Beach lease was granted in 1947. But under certain conditions this type of structure may be by far the most practical for developing offshore reserves.

. . . **The island,** built in 45-ft. waters, has cost the companies about $1,000,000. This includes almost $200,000 in upkeep and contractor's expenses which were lost when litigation delayed completion for 14 months. Including this, though, average cost for each location thus will be about $14,000 if all 70 wells are drilled.

Originally it was planned to enlarge the island to an 800-ft. square after two or three exploratory wells had been



DECK LAYOUT will allow 70 wells to be drilled and completed as shown. Completed wells are submerged in a number of isolated cellars at lower deck level.

drilled. Double-decking was doubly beneficial: (1) The 70 wells may permit complete development of the lease at only a fraction of the cost of the enlarged island, and (2) continuous drilling was permitted whereas enlargement would have required suspension of drilling for 1½ to 2 years.

Initial plan . . . After the concrete-capped structure was completed and four wells drilled, it became apparent that, by careful planning, three additional wells could be drilled. Further studies then showed three more wells could be added by using the mud pit as a cellar.

Encouraged by this success the operator, Monterey, began a study to determine how many wells might be drilled if the island were modified. The chief problem was to provide cellar space. The floor could be dug out between the series of beams which support it. However, it was found it would be cheaper and better to build the cellars upward from the original working floor, and create a new level 9 ft. above the original floor.

While drilling continued in the cellar on the west side of the island, conductors for wells to be drilled from the upper level were driven on the east side. Then when the final three wells were drilling, remainder of the 60 conductors were set on the west side. All were spaced on 5-ft. centers as shown in the plan view.

Adding upper level . . . In preparation for the additional weight the island was to carry, an annular ring was dug through the sand which fills the upper portion. Bottom of the annular tunnel was in the gravel which filled the island to that level (see cross-section view).

This annular space was filled with gravel. Then pipes were driven through the filled area into the original gravel and cement was pumped in. This filled the interstices in the gravel to form a ring of concrete around the island, inside the interlocking sheet steel piling which forms the perimeter. Unfilled spaces under the concrete floor also were grouted full.

With this completed, and while drilling was under way on the east side, construction of the raised level was started on the west side. The rig then was jacked up to the new working level and moved over to the completed west side. Drilling was suspended while the cement was hardening.

After additional gravel filling and grouting were done around the original mud pit, to further strengthen that area, construction of the second level on the east side was started.

Resumption of drilling on the west side in mid-March resulted in a new pool discovery. Whereas the first 10 wells had been completed in a 6,000-ft. pay, the first upper-deck well was in a shallower pay at a drilled depth of 3,965 ft.

Since last July the island-based wells have been producing through an 8-in. line to a tank battery located 2,500 ft. inland. The commingled oil and gas is shipped to shore through the 10,000-bbl.-capacity line and separated in on-shore traps. New wells are tested through an island-based separator. This crude then flows to shore through a 3-in. line, one of three such laid in a bundle with the 8-in. line.

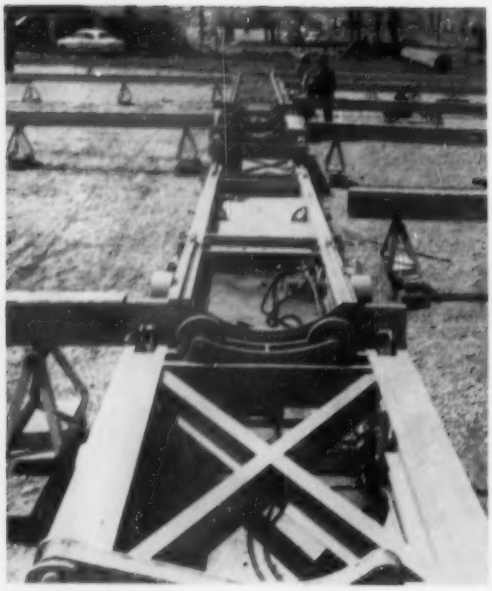
Unusual precautions have been taken for the safety of personnel and security of property, due to the unavoidable congestion caused by the large number of wells proposed for the island.

Safety measures . . . The unavoidable congestion caused by the large number of wells proposed for the island caused Monterey to take unusual precautions for the safety of personnel and security of property.

All cellars have either watertight doors opening out to a catwalk, which encircles the portion of the island exposed to the ocean, or have permanent openings out to the wharf.

Each cellar will be provided with a device to detect dangerous concentrations of inflammable gas. These will automatically sound an alarm. All cellars will contain lines for foam and fog fire extinguishers, with permanent overhead nozzles. Other key points of the island and wharf will also be so protected.

Each well and cellar will be provided with an automatic shutoff device. These will close each complete cellar, or all the island wells, in case of a rupture of a flow line. All of these controls also will provided for manual operation.



HYDRAULIC-POWERED lineup cradles for rack are mounted on rails and can be moved in front of either of two racks for final welds.

CONTROLS FOR LINEUP are mounted on main carriage. Pipe can be moved endwise, vertically, or horizontally. Fourth lever kicks pipe out of rack.

More Footage=Lower Construction Cost

. . . and advanced double-jointing equipment gets that extra footage

by Paul Reed and R. G. Deering

This new equipment promises to increase pipeline contractors' gross income. It uses hydraulic and electronic equipment to achieve a high efficiency. A movable lineup carriage feeds two parallel racks and automatic pipe rollers start turning when a welder strikes his arc. It means faster construction and ultimately more savings for the pipeline company.

MORE footage from the pipe gang means more profit for the contractor. And the way to get more footage is by using joints as long as the terrain conditions will permit. Where terrain conditions are favorable the best way to get the longest joints that are practicable is by double-jointing 30-ft. joints to make 60-ft. joints and 40-ft. joints to make 80-ft. joints.

The technique of double-jointing pipe in a yard has been greatly advanced recently by development of new equipment. This equipment features a movable, hydraulically powered lineup carriage, rollers that start turning pipe automatically when a welder strikes his arc, a rugged design, and a high degree of portability. Though engineered for high efficiency, the equipment is very simple in design and operation.

M. J. Crose Manufacturing Co., Inc., designed and fabricated the equipment for H. C. Price Co. Price is using the yard near Athens, Ohio, to double 30-ft. joints of 26-in. for a Tennessee Gas Transmission Co. job.

The advantages of greater spread output through use of longer joints are so many that it would be highly profitable to double-joint even if yard welds would cost more than welds on the right-of-way, though this is contrary to reasonable expectations. Savings accomplished by a double-jointing yard are indicated by a comparison of costs:

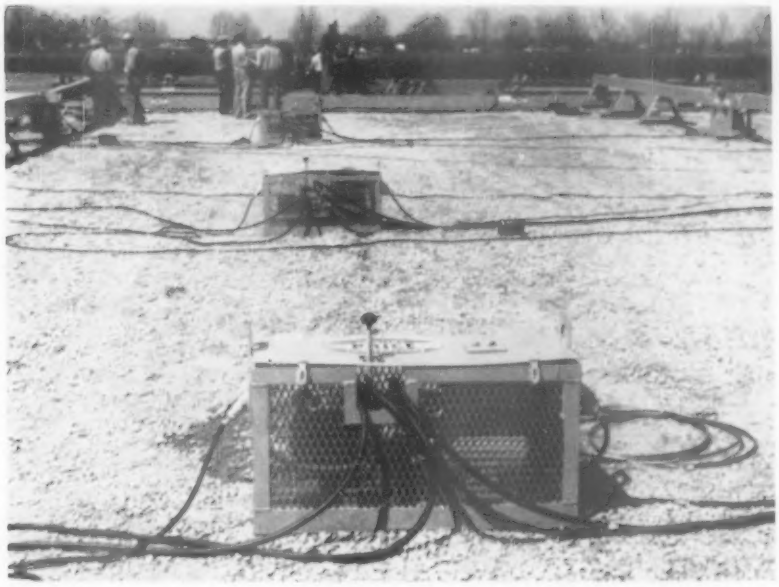
The double-jointing rack and all special equipment costs $75,000, not including cost of welding machines and tractors.

Eight welders at the yard can make 120 to 130 welds per day at a lower cost than the 16 to 22 welders in the average big-inch welding gang can make on the right-of-way. Welds on 30-in. pipe in other double-jointing yards with less-advanced equipment cost from $10 to $15 per weld, including all yard costs. The same welds made on the right-of-way are estimated to cost at least $16 to $25 per weld.

The advantage of yard double-jointing is even greater at remote areas—especially in foreign countries where pipeline construction crews live in camps. On such projects double jointing brings substantial economies in reducing expense of camp-man-days.

More daily footage . . . However, the big advantage is not in the reduction in welding costs but in advantages resulting from increased spread output. In some cases use of double joints may increase a spread's output by as much as 3,500 ft. per day. This is assuming, of course, that pipe laying would be done under very favorable terrain and weather conditions when the contractor might

PIPELINING



CONTROL STATIONS between rollway racks are for hydraulically kicking joints out of pipe-rolling stations.

lay 80-ft. joints (double-jointed from 40-ft. joints) at the rate of 140 joints per day. Figured on this basis, double-jointing might increase the contractor's gross income by more than $11,000 to $12,000 a day ($3.50 to $4.00 per ft.).

As an example, using single 40-ft. joints:

(140 joints per day) × (40 ft. per joint) = 5,600 ft.

(5,600 ft.) × ($4.00 per ft. gross) = $22,400.

Using double joints:

(112 joints per day) × (80 ft. per joint) = 8,960 ft.

(8,960 ft.) × ($4.00 per ft. gross) = $35,840.

$35,840 — $22,400 = $13,440 increased gross income.

One can see from the above that even figuring a 20 per cent reduction in line-ups per day while using 80-ft. pipe would still increase gross income by $13,400, or about 50 per cent.

Construction advantages of double jointing may be summarized as follows:

1. Double jointing with properly designed equipment will give better welding and more uniform welding.

2. Lineup is done under ideal conditions.

3. Bending is easier with the longer joints; i.e., it is simpler to make long bends with 60 or 80-ft. pipe than with 30 or 40-ft. pipe.

4. Welding can be started when terrain or weather conditions are such that actual field construction could not start.

The rack described here facilitates making of 120 to 130 welds per 10-hour day. But to keep this pace the lineup gang may have to work overtime. This output of say 125 welds per day represents about 7,500 ft. of 30-ft.-joint pipe or 10,000 ft. of 40-ft.-joint pipe.

Therefore, it is advantageous to start double jointing at a stock pile before actual laying starts so there will be plenty of long joints ready for laying.

Features of New Equipment

The new Crose rack being used by Price has several advantages over previous racks:

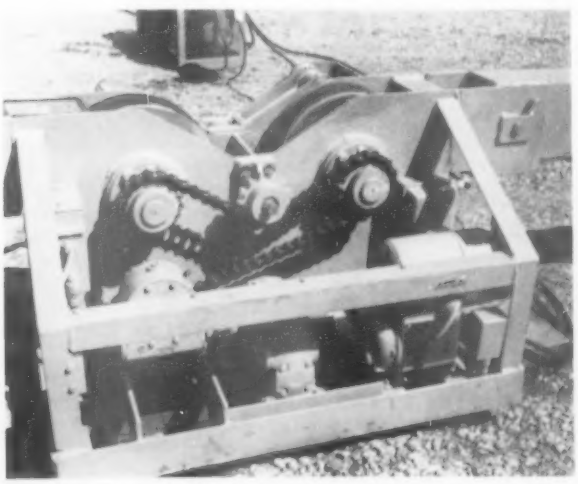
1. A movable lineup carriage feeds double-jointed pipe to two rollways (instead of the usual one), for running the hot pass and the last two beads.

2. Pipe rollers at final welding stations start turning automatically when the welder strikes his arc.

3. Design of the rack and associated equipment is for rigidity, interchangeability of parts, and quick assembly and dismantling.

The lineup assembly consists of a main carriage mounted on rails laid perpendicular to the rollways and two smaller cars rail-mounted on the main carriage. These smaller cars support cradles to hold the pipe and also have hydraulic rams for lineup.

One car is hydraulically powered to move longitudinally for spacing the joints. The other car is free wheeling. One cradle on each car is powered by hydraulic rams to move the pipe during lineup. In the free-wheeling car the cradle nearest the point of lineup moves laterally to effect lineup in the 3 to 9 o'clock axis. The other car's outboard cradle; i.e., the cradle farthest from the point of lineup, moves vertically to



AUTOMATIC PIPE ROLLERS, three to each rack, start turning pipe automatically when arc is struck.

LINEUP CLAMP retracts into this pup joint as two more joints are placed in cradles.

line up pipe in the 6 to 12 o'clock axis. Thus, the hydraulic system allows moving the pipe in three planes for lineup—longitudinal, horizontal, and vertical.

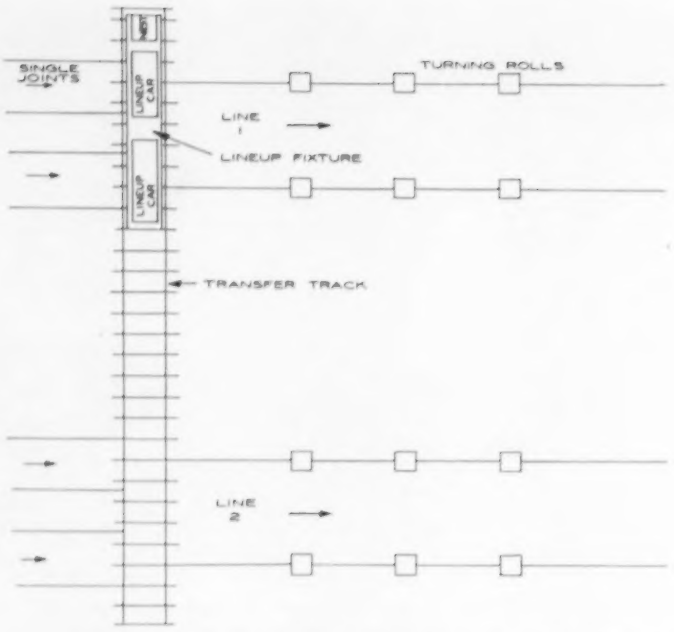
Rollers on cradles of both cars allow turning the joints by hand to separate the longitudinal seams. During lineup, an internal clamp is inserted and the joints held stationary and rigid until completion of the stringer bead.

Controls for all operations of the lineup equipment are located near the center of the main carriage. These are merely levers which control valves in the hydraulic lines. Power for the hydraulic system comes from a motor-driven pump located within a stand at one end of the main carriage.

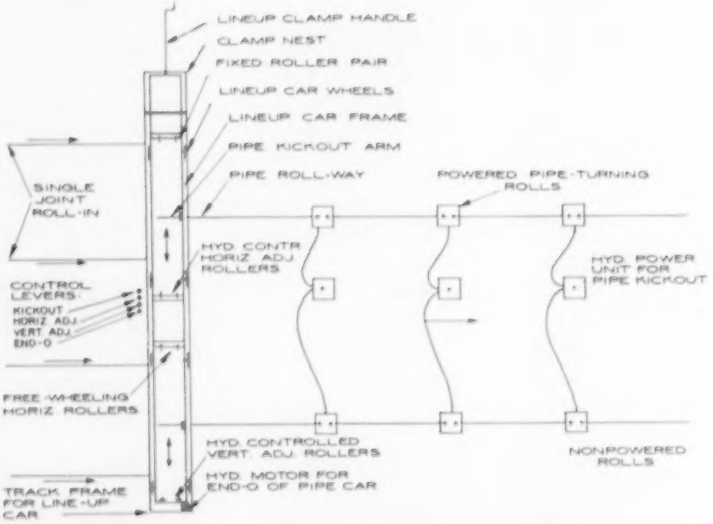
To adjust for different lengths of pipe (i.e., 30 or 40-ft.), there is a 14-ft. spacer which bolts into place in the center of the carriage. When working 30-ft. joints this spacer is removed.

For convenience in handling the internal lineup clamp, a stand at one end of the main carriage holds a pup joint of the same diameter as the pipe being worked. This joint is aligned with pipe in the cradles. When stringer-bead welding is finished on one joint, the clamp is retracted into this pup, ready for insertion into the next joint.

Use of two rollway racks instead of one will allow continuous operation of the lineup carriage and gang. When one set of racks is filled with pipe awaiting filler and finish beads, the carriage will be moved over in front of the other rack and start working there. Speed of the lineup stringer, hot pass, and work will allow that gang to keep up with filler and finish work on both racks. If a single long rack is used, it needs the same number of filler and finish welding stations but requires more pipe handling. This continual moving of pipe means more interruptions to welders.



Rack was designed for parallel operation of rollways but . . .



. . . depending on terrain, can be used with one long rollway.

Automatic rollers . . . Following the stringer bead, the double joint is kicked out of the lineup cradle by hydraulic jacks. It rolls onto one set of racks and proceeds to a pipe-rolling station. Here each end of the joint drops into rollers set into the rollways. Three rolling stations are located on each of the parallel racks.

Operation of these automatic rollers is one of the outstanding features of the entire system. The speed of the rollers is adjustable over a wide range. The welder has the option of setting his rolls for continuous roll at a preset speed or setting it on automatic. When on automatic the rolls start to turn when the welder strikes an arc. They stop as soon as he stops welding. In addition, he has a button switch on his electrode holder which allows him to start and stop the rolls while continuing to weld.

In practice the welder sets the speed for a slightly faster rate than he will weld. He stops the rolls to maintain his best position and starts again at will. The welder therefore has absolute control of turning speed and can position his rod at the exact spot he desires.

Drive for the rollers is by a variable-speed ¾-hp. motor through a series of gear reductions. On-and-off control of this motor is by a relay which has its coil across terminals of the welding generator. The relay contacts are in series with the motor power supply. During no load on the welding generator the terminal voltage is about 80 volts, enough to hold the relay open. When welding starts this voltage drops to about 20 volts and the relay closes, starting the motor. A variable resistance in series with the relay coil allows setting the relay action to be certain of its working regardless of minor changes in voltage characteristics between different welding machines.

Output speed of the driving motor is mechanically variable by a lever on

the motor. Peripheral speed of the pipe can be changed from a minimum of 10 to a maximum of 18 in. per minute. This will take care of different types of beads and different wall thickness and rod size. Permissive switches on the welder's electrode handle which control whether the rollers are on or off are wired in series with the motor supply.

Each pipe-rolling station has hydraulic jacks to lift pipe from the rollers and send it on down the rack when welding at that station is ended. These jacks are supplied from a hydraulic power jack located in a metal box near the welding position. This pack consists of a 3-hp. motor driving a small pump. It feeds jacks located at both ends of the joint. A single valve control for both jacks is located at the pump in reach of the welder's helper.

Power for motors which drive hydraulic pumps and for the pipe rollers is supplied by an engine-generator unit rated at 37½ kva. at either 120 or 240 volts. Thus power for the entire rack, with the exception of that for welding machines, is supplied by this engine-generator unit. All electric leads are plug-in type and all hydraulic lines have quick make connectors. Leads and lines are of minimum length so there is little excess to interfere with other operations.

Racks are rigid . . . Vital points on the design of the rack are the provisions for rigidity and interchangeability. These are essential for success in assembling and tearing down. This was recognized as vital for success of the design by J. M. (Sam) Lewis, Crose's chief engineer, who has had long experience with fabrication and operation of such double-jointing equipment.

Sections are heavy to withstand distortion. Experience in the past has shown that the most severe strains are put on a pipe rack during the times when it is built up and torn down, and also to less extent when moved.

Specially designed supports for the skidways hold the unit in position under varying conditions of yard terrain. There is no danger of these supports slipping out under the jiggling and battering effect of operations. The rollways are of hollow box construction for additional strength and rigidity.

Portability . . . To speed up assembly work, the 20-ft. sections of rack are joined by pins. These are dropped from above into big V-notches where they are held in place by scab-over plates attached later. This practice avoids delays from the usual threading of pins through holes.

There is complete interchangeability between all pieces of the rollway and all units for rotating and kickout.

The rack covers 1½ acres and weighs 90,000 lb. It can be dismantled in half a day and loaded on three trucks for movement to the next job. Setup requires a day.

The yard equipment could be fabricated and ready for shipment to a new job in 30 days.

Adaptable to automatic welding . . . The rack and its equipment have been designed primarily for manual electric arc welding.

Automatic submerged arc-welding equipment could be installed which would supplant the need for part of the rotating equipment for manual finish-bead welding. The advantage of automatic welding would be assurance of greater uniformity of welding quality and the elimination of five manual welders.

Additional equipment for automatic submerged arc welding would cost $25,000. But automatic welding would supplant the need for part of the rotating and kickout equipment costing $10,000. So the net additional cost for automatic welding equipment would be only $15,000.

The Crose welding-rack equipment is suitable for any automatic or semiautomatic process requiring rotation of the pipe. Therefore, it is available for such methods which may be approved by pipeline companies in the future.

BOOKS

DESIGN OF PIPING SYSTEMS, Second Edition. By members of the engineering departments of M. W. Kellogg Co. Published by John Wiley & Sons, 440 Fourth Avenue, New York 16. 365 pp., 8⅝ by 11¼ in., 319 illustrations, $15.00.

This second edition of "Design of Piping Systems" offers comprehensive account of the entire subject of structural design of piping systems. It includes a detailed and complete treatment of thermal expansion and shows how this treatment is extended to calculating the effects of uniform loading like that due to weight or wind.

The material in this book can be useful not only for the evaluation of piping stresses but also to get a better understanding of the significance of such stresses on piping performance. It can also be helpful in solving other piping-design problems. For example, the treatment of expansion-joint systems describes arrangements for large high-temperature lines located in confined areas.

A chapter on pipe supports presents an organized discussion of the subject and covers the various problems involved in supporting critical piping. This book approaches the subject of vibration from the standpoint of the piping designer and deals with the objective of achieving vibration-free piping in the design phase of a project.

Other subjects covered include strength and failure of materials, design assumptions, stress evaluation, and design limits. The book also presents a simplified method for flexibility analysis and explains flexibility analysis both by the general analytical method and by model test. It goes into the subject of supporting, restraining, and bracing the piping system and gives the derivation of acoustic vibration formulas. And, it presents numerous engineering charts and tables.

AUTOMATIC PROCESS CONTROL FOR CHEMICAL ENGINEERS, by Norman H. Ceaglske. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. 228 pp., $6.75.

This book is written directly for the chemical engineer, on the theory that chemical engineers cannot have a fully rounded knowledge of their profession unless they are familiar with the fundamentals of automatic control.

The author presents and applies the basic mathematical principles of process control in an elementary form. He first considers the principles of instrumentation and their application to simple control systems. The next chapters are devoted to derivation of equations and solutions by the standard methods of differential equations.

The final chapters deal with transient analysis of control systems, frequency response control systems, and analysis of simple control systems. Examples and illustrations are given to demonstrate the use of equations. Typical problems are offered at the end of each chapter.

SCHEDULING OF PETROLEUM REFINERY OPERATIONS. By Alan S. Manne. Published by Harvard University Press, Cambridge, Mass. 185 pp.

This book reviews conventional refinery cost-accounting methods and presents four case studies. They cover: (1) the allocation of individual crude oils to several refineries at different locations; (2) naphtha reforming; (3) gasoline blending; and (4) scheduling for a small integrated plant that performs cracking, recycling, and blending.

As a result of the individual calculations, it is possible to obtain a better understanding of how a refiner might respond to changes in several kinds of variables. It is practicable to analyze the manufacturing-process activities within any required degree of detail.

REPORT ON THE SIXTH BIENNIAL CORROSION TOUR, PERMIAN BASIN SECTION, N.A.C.E. Edited by H. S. Winston and John C. Watts, Jr. Copies may be obtained from Roscoe Jarman, Box 2049, Odessa Tex. 62 pp., $3.

This book contains articles and case histories of corrosion in West Texas production systems. Some 55 case histories are outlined, including installation history, discussion of the corrosion, and suggestions for mitigation or prevention in future installations.

PROCEEDINGS OF THE WORLD SYMPOSIUM ON APPLIED SOLAR ENERGY. Published by Association for Applied Solar Energy, 204 Heard Bldg., Phoenix, Ariz., 304 pp., $5.

This 300-page booklet contains the full proceedings of the World Symposium on Applied Solar Energy held in Phoenix, Ariz., November 1-5, 1955. Introduced by a seven-page picture section covering the various sessions and the Solar Engineering Exhibit (held in conjunction with the Symposium), the Proceedings present papers by 30 internationally recognized authorities on solar-energy utilization.

Photographs and drawings illustrate papers on solar furnaces, flat-plate collector applications, algal culture, electrical-energy conversion, and architectural design. The final section of the book contains a summary of a round-table discussion on "The Future of Applied Solar Energy," in which Symposium participants discussed the present status and future possibilities of solar-energy utilization.

ELEMENTS OF FIELD PROCESSING—14

Oil-Field Instrumentation—Definition of Terms

by Paul S. Ache* and John M. Campbell†

A LARGE percentage of the routine problems encountered with lease equipment stems from failure or misapplication of controls. This has become even more pronounced in recent years as this equipment has become more complex.

Oil-field instrumentation is less complex than that in plants and refineries but operates under severe service conditions. In such service, the instruments often have wet supply gas only, infrequent adjustment by expert servicemen, and are exposed to the elements. Yet they must give continuous and trouble-free service. Despite these severe conditions, many troubles stem from improper application rather than inadequacy of the controls themselves, although many types are not suitable for oil-field use.

Control terms . . . In order to choose controls properly, one must know not only the requirements of the process but also the corresponding characteristics of the controls available. No understanding of controls may be complete without a familiarity with applicable nomenclature.

Pneumatic controls—those which are actuated by air or gas. (The most common type used in the field.)

Diaphragm motor valve—the term applied to a complete valve that uses pressure to open and close it.

Topworks (motor)—that portion of the motor valve which contains the mechanism to open and close the valve.

Innervalve assembly (trim)—includes the stem and seat within the valve body that actually controls the flow of fluid.

Fluid—any liquid or gas being controlled.

Proportional control—the system whereby the valve opening is proportional to the degree of change in the controlled variable.

Snap action—a mode of control whereby the valve is either wide open or fully closed.

Reset—an addition to a proportional control system to enable the instrument to hold itself at the control point as the process load varies.

Derivative response—a further addition that provides corrective action based on the time rate of change of the deviation from the control point.

Self-operated controller—a valve which is actuated directly by the controlled variable.

Pilot—a relay that transforms the controlled variable into an equivalent signal to the control valve, such signal controlling the action of that valve.

Supply gas—that gas necessary in a pneumatice pilot to operate it.

Controlled variable — the pressure, liquid level, temperature, or flow rate being controlled.

Measuring means—the means used to detect any change in the controlled variable.

Sensitivity—the ability to detect small deviations in the controlled variable.

Reproducibility—the ability of an instrument to repeat and measure consistently the value of the static condition over a period of time.

Static error—the difference between the absolute value of the controlled variable and the measured value.

Lag—the period of time by which the measured value follows the change in the absolute value of the controlled variable.

Static conditions—where all changes in the controlled variable are instantaneous.

Dynamic conditions—where the controlled variable is continually changing.

Normally closed valve—a valve that is held closed by a spring or some similar device and is opened by the action of pilot or the controlled variable or both.

Characteristic—	Thermal
Capacity	B.t.u.
Potential	Deg.
Capacitance	B.t.u./deg.
Resistance	Deg./B.t.u./sec.

Normally open valve—reverse of the above. One that is closed by the action of the pilot or the controlled variable or both.

Drift—this item includes reproducibility and the inability to repeat a measurement due to changes in the measured variable.

Process . . . Since the purpose of an automatic controller is to regulate a process, it is fundamental that the process be defined. A process is the collective functions performed in and by equipment in which a variable is controlled. As an example, a field heater which heats well effluent by hot circulating water in a unit of equipment in which the process of heating the well stream is accomplished. In the process is a controllable variable (the temperature) and a controllable medium (the well stream). Other controllable variables could be rate of flow, liquid level, or pressure. A control agent (circulating water) is the medium for effecting the temperature change, and thus regulation of the control agent regulates the controlled variable.

The total requirements of the process for the control agent at any one time is defined as the process load. If the rate of flow of the well stream increases, then more or hotter water is required to maintain the same temperature, and a change in process load has taken place. By the same token, a drop in inlet temperature at the original rate of flow would also constitute a process load change.

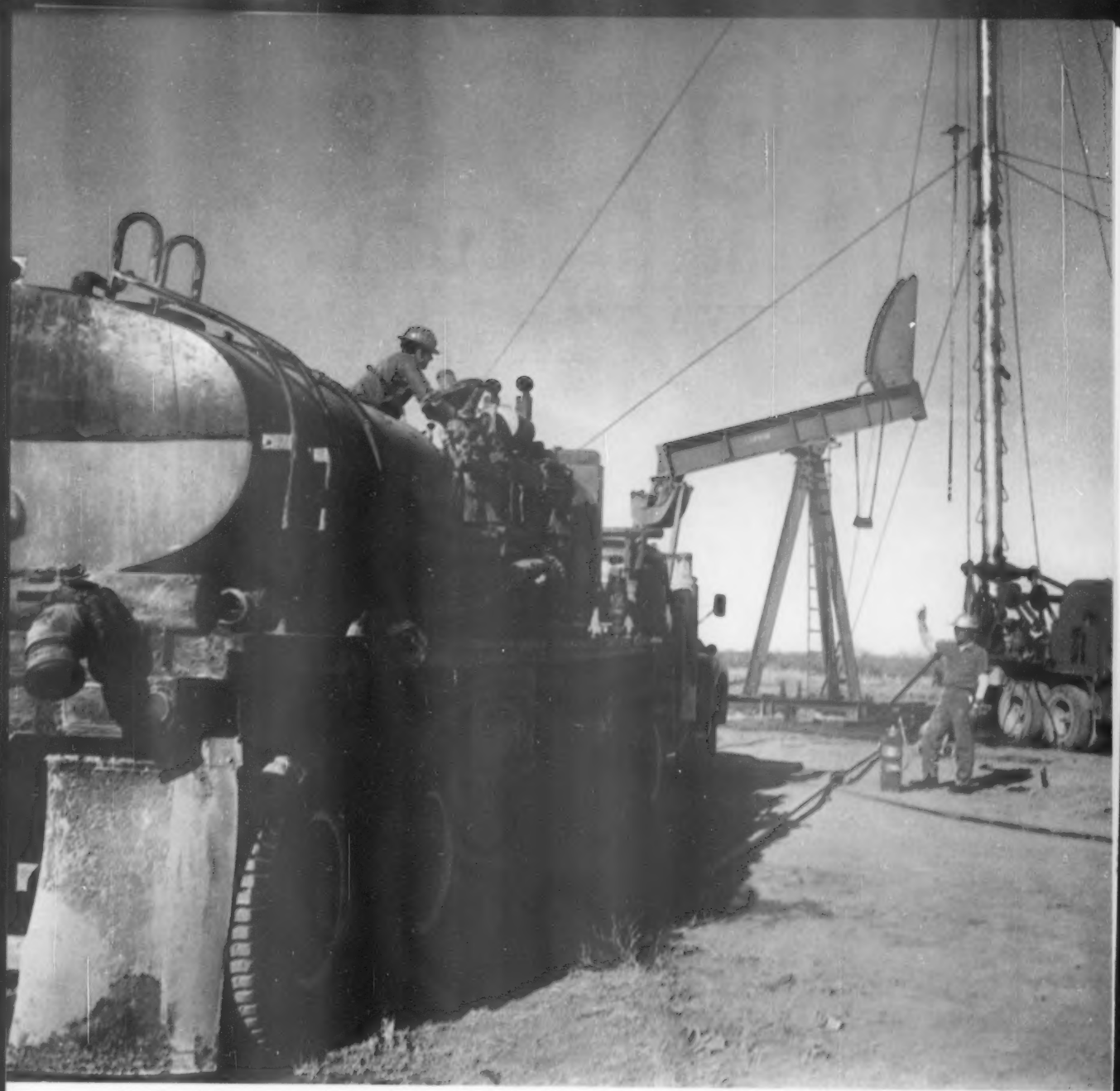
. . . Characteristics of a process include its potential, capacitance, resistance, and dead time. Capacitance, not to be confused with capacity, is the change in the quantity of energy or material per unit change in some variable, usually the controlled variable. The table below summarizes the characteristics of a process.

Pressure	Liquid level	Electrical
Cu ft.	Cu. ft.	Coulomb
Psi.	Ft.	Volt
Cu.ft./psi.	Cu. ft./ft.	Farad
Psi./cu. ft./sec.	Ft./cu. ft./sec.	Ohm

Dead time is that time lag which occurs when energy is being transferred at a constant rate of flow through a given distance. It is equal to the time it takes the energy to move the distance. The dead time is a characteristic of the process, and it is not to be confused with the time lag inherent in the automatic controller itself.

*Graduate assistant, University of Oklahoma; present address, Shell Oil Co., Houston. †Department of petroleum engineering, University of Oklahoma, Norman.

FIELD PROCESSING



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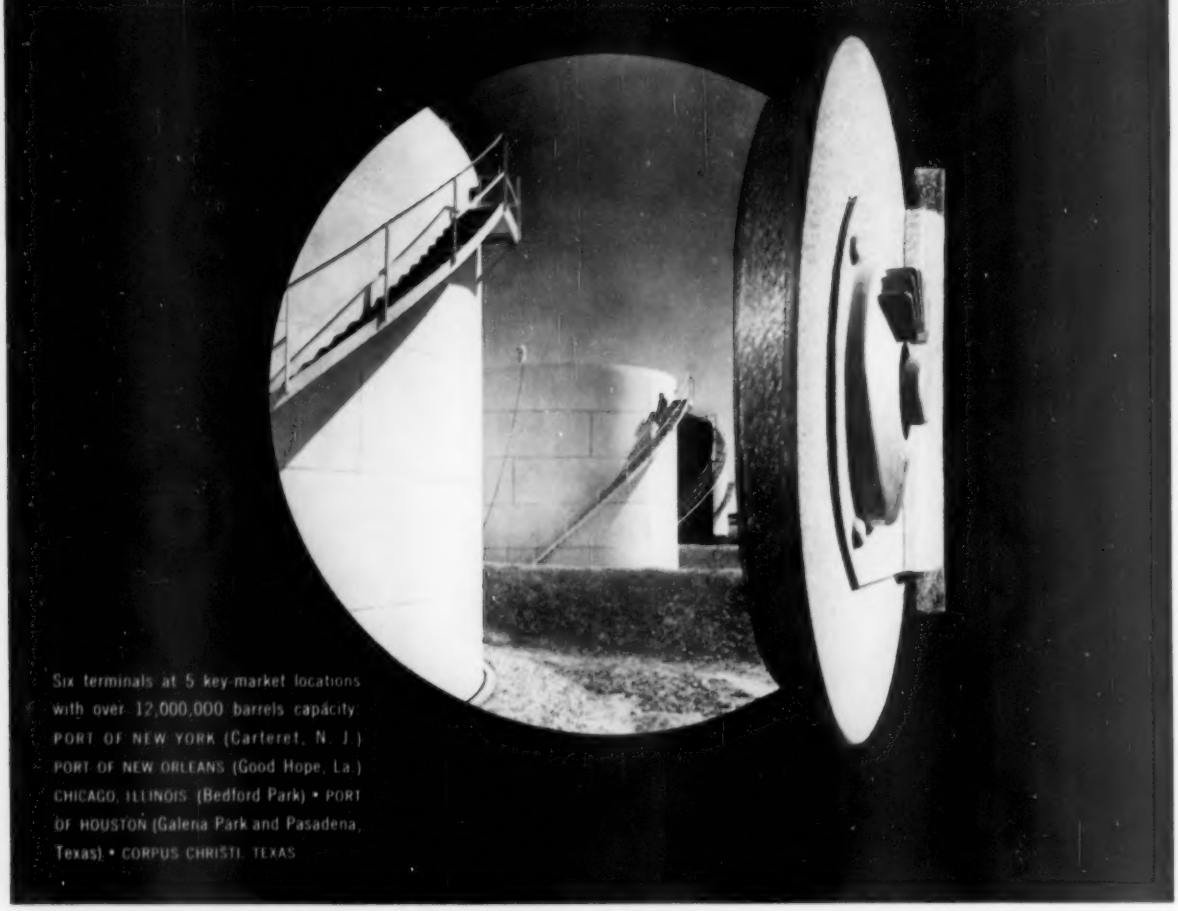

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MAKING ETHYLENE—3

Designing a Tubular Pyrolysis Furnace

by H. C. Schutt* and S. B. Zdonik†

Part 1 of this series appeared February 13, page 98.
Part 2 appeared April 2, page 99. This dealt with ethylene processing schemes and compared cracking coil and regenerative methods of pyrolysis. Later articles will be concerned with: primary separation of pyrolysis products, ethylene recovery, and ethylene storage and transportation.

THE fundamental considerations which govern the design of a pyrolysis furnace are numerous and interrelated so that optimum conditions must be established.

- **The most economical operation** is obtained when the conversion per pass and the ethylene concentration in the coil effluent product are relatively high.
- **The conversion** is the result of the time-temperature effect, and the olefin concentration in the effluent is dependent on the temperature and partial pressure of the reactant. Time and temperature are not interchangeable or compensative in producing a given conversion and product distribution pattern.
- **Temperature is the most important** factor governing the olefin production per pass due to its effects on chemical reaction equilibria and reaction rates.

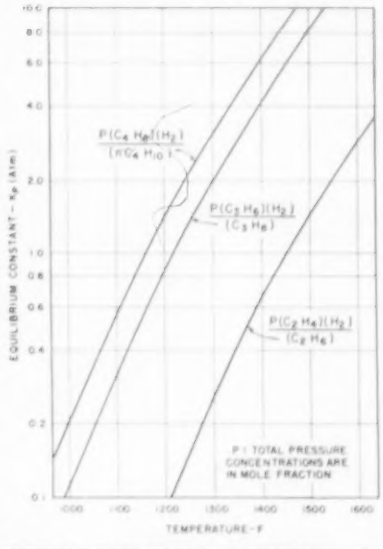
Effect of Equilibrium Approach

The reaction systems involved in hydrocarbon pyrolysis become more complex as the molecular weight of the feed increases. Only in the range of low conversions and only for the lower-molecular-weight compounds have the primary molecular conversion mechanisms been established. However, in high-temperature pyrolysis at an equivalent residence time (related to the coil outlet temperature) in the order of 1 second, the approach to equilibrium of the dehydrogenation reactions has a pronounced influence on the product distribution. This is especially true for the ethane-ethylene-hydrogen reactions. This equilibrium approach also affects the extent of secondary reactions and operability of the reaction coil as far as carbon formation and deposition are concerned.

Dehydrogenation equilibrium . . . Fig. 6 gives the equilibrium constant versus temperature relationship for the ethane, propane, and normal butane dehydrogenation reactions.[10 11 12] It is apparent that the ethane-ethylene-hydrogen equilibrium must be of the greatest concern to the designer of a pyrolysis apparatus. If this equilibrium is closely approached or attained either by extending the residence time or by a high reaction temperature, the conversion products in the C_4 and lighter range are essentially of the same composition for a wide range of feed stocks—propane, butane, light and heavy petroleum fractions.

When this equilibrium is approached, secondary reactions in which the primary olefins or their free radical equivalents participate, proceed at increasing rates leading to the formation of heavy liquid fractions, tar and coke, which will make the coil-type reactor inoperable.

Effect of equilibrium approach . . . Linden and Peck[13] have studied the effect of equilibrium approach on product distribution, and their experimental data furnish convincing evidence of its influence on olefin yields and the extent of side reactions. For example in their run 251, butane is cracked at 1,500° F. and 4.26 seconds reaction time resulting in over 99 per cent conversion and a yield of C_3 and heavier fractions of 28.7 wt. per cent. The liquid product contains 1.6 wt. per cent solids which would cause plugging of a commercial reaction coil within a very short time. Normal butane is successfully processed in tubular furnaces at 90 to 92 per cent conversion with approximately 60 per cent approach to equilibrium and an ethylene and propylene yield of about 50 wt. per cent per pass. Under the severe cracking condition and attainment of the ethane-ethylene-hydrogen equilibrium in the test reported by Linden and Peck, the conversion product distribution is totally different and the olefin yield is reduced to approximately one-half of that obtainable in commercial pyrolysis coils under optimum operating conditions.



DEHYDROGENATION EQUILIBRIA, for the reaction, alkane yields olefin plus hydrogen. Fig. 6.

Other equilibrium hindrances . . . The ethane-ethylene-hydrogen equilibrium is the most important criterion of the reaction-coil operability for sustained yields of ethylene within a postulated products pattern. However, other conversion mechanics, such as dehydrogenation, demethanization of propane and butane, hydrogenolysis of paraffins, polymerization of olefins which are known to occur, are examined in some cases with respect to equilibrium hindrances which may affect the product distribution.

Degree of equilibrium approach . . . This will depend on reaction-coil design, principally the mass velocity and flow pattern of the reactant in the coil, the temperature gradient and the heat intensity in the zone of higher conversion. A well-designed reaction coil employing mass velocities in the order of 20-35 lb. per sq. ft. per second, a continuously rising temperature gradient and a heat intensity in the critical reaction zone only slightly in excess of the heat of reaction will permit an

*Consulting engineer, 201 Devonshire, Boston. †Process engineer, Stone & Webster Engineering Corp., Boston.

What do you know about Kelly Bushings?

I'm a BJ Oil Tool Representative. When I talk to various oil men about BJ Kelly Bushings I find they all bring up the same questions. So I thought it would be a good idea to present these questions and the answers I give.

Question: "Your Kelly bushing is the friction type. Doesn't this liner-type Kelly bushing tend to hold up on the weight?"

Answer: "If you look at the design of our BJ Type 'B' Kelly Bushing you'll see two BJ Kelly Wipers. One is at the top of the bushing and the other at the bottom. These wipers retain oil or grease inside the bushing so that there is constant lubrication between the Kelly and the steel liners. No, BJ Type 'B' *Lubricated* Bushings do *not* hold up on the weight."

Question: "What about these reversible liners? How effective are they?"

Answer: "First, BJ Kelly Bushings are the only Kelly bushings which have reversible steel liners. Roller types cannot be reversed, and neither can other friction types. The BJ reversible liners not only give you double life and lower replacement costs but their 18-inch bearing surface is considerably better for a Kelly than the two to five contact points in the roller types. Also, it is easy to change the liners of a BJ Bushing when rigging up at a new location and there is no unnecessary machine shop expense."

Question: "You say this rubber cushion feature is an exclusive one on your bushing. What I want to know is what's so special about it?"

Answer: "The Neoprene rubber cushion between the slips and the body of the bushing does this: it absorbs the shock from drilling and relieves the beating between the Kelly and the liners on the slip as well as reducing wear on the master bushing in the rotary table. As you know, decreased wear in these areas cuts repair costs and downtime. Also, this rubber cushion dampens the vibration of the drilling string, greatly reducing noise . . . and noise reduction is being given major stress in safety programs today."

Question: "How about putting this bushing in the rotary table? Is it hard to do?"

Answer: "The long guide skirt at the bottom of the body makes it fast and easy to put the bushing in the rotary table, even if the drill pipe is hanging off center with the rotary table. This eliminates time spent in barring a bushing to get it in, and it is also a safety feature."

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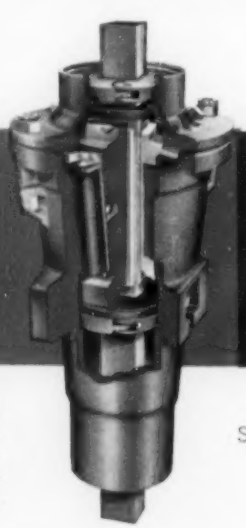

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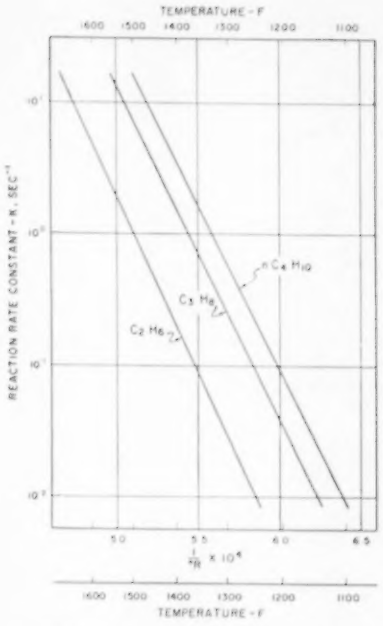


REACTION RATE as function of temperature, first-order mechanism. Fig. 7.

equilibrium approach of within 60 per cent of the theoretical.

The reaction rate as a function of the temperature is another important kinetic consideration in the design of pyrolysis coils. It will determine the rate of heat application necessary to attain a temperature in the zone of high conversion or at the reactor outlet commensurate with the tolerable equilibrium approach. The reaction-rate data used in the design must be rather accurate.

In Fig. 7* the reaction velocity constants are given for the thermal dissociation of ethane, propane, and butane as established in experimental tests[1 2 3 4] and confirmed by large-scale commercial operation. The constant is expressed in terms of disappearance of the parent reactant per unit time.

The primary reaction involving the scission of the original constituent is no doubt unimolecular, and the conversion rates follow the first order concept for a wide molecular weight range and up to a high disappearance of the original reactant, provided there is no distinct equilibrium hindrance. The olefins and other conversion products are formed from atomic and free radical species resulting from the primary dissociation. The rate of these secondary reactions is very high and should have no effect on the primary decomposition.

The temperature gradient is of considerable importance. It should be continuously rising toward the coil outlet. A temperature drop in the last section of the conversion zone will involve the danger of too close an equilibrium approach.

*Fig. 7 is a corrected version of Fig. 6 presented in the second installment of this series. We are also repeating the discussion of this figure.

TABLE 12—HEAT TRANSFER RATES IN ZONE OF HIGH CONVERSION

I.d. of tube, in.	Cracking stock	Mass velocity, lb./sq. ft./sec.	Range of conversion, per cent	Heat intensity, B.t.u./sq. ft./hr.
4.0	Ethane	23-26	50-60	7,500-9,000
4.0	Propane	26-28	70-85	4,500-5,500
4.0	Butane	28-32	75-90	3,500-4,500
4.5	Naphtha	24-26	50-58*	3,500-4,500

*Weight per cent C_4 and lighter.

Desirable Temperature Gradient

On the other hand, a sharp temperature rise in the zone of high conversion is not desirable as it will entail high heat intensity, high reactant film temperatures, and higher rates of secondary reaction which may lead to coke formation. It is most advantageous to graduate the heat intensity while the reactant is in the advanced state of conversion so that the heat input is only slightly in excess of the heat of reaction and produces a temperature rise commensurate with the permissible equilibrium approach.

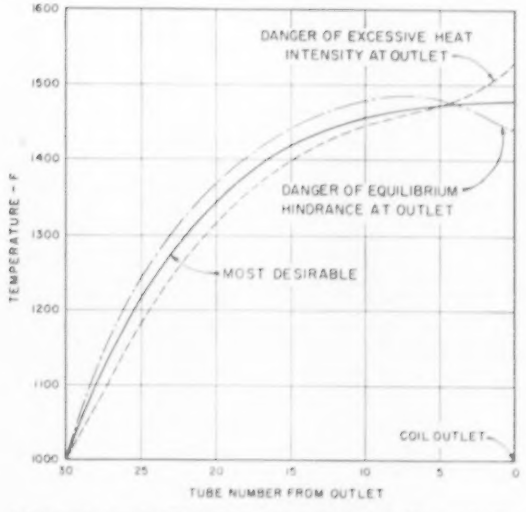
Graduate the heat intensity . . . Fig. 8 may serve as a general illustration of what constitutes the most desirable temperature gradient in the course of the progressing conversion. High heat intensity for the purpose of reaching the required temperature level should be applied up to a medium point of conversion, approximately 50 per cent of the total reaction to be obtained with the equilibrium approach not exceeding 40 per cent.

Commercial design . . . It must, of course, be realized that practical commercial furnace designs, i.e., the arrangement of the reaction coil in a box-type setting with specific location of burners, will offer no means of varying at will the heat-transfer rate from tube to tube to produce the "ideal" temperature gradient. The heat-intensity pattern can only be varied within certain limits and the above design consideration satisfied to a degree.

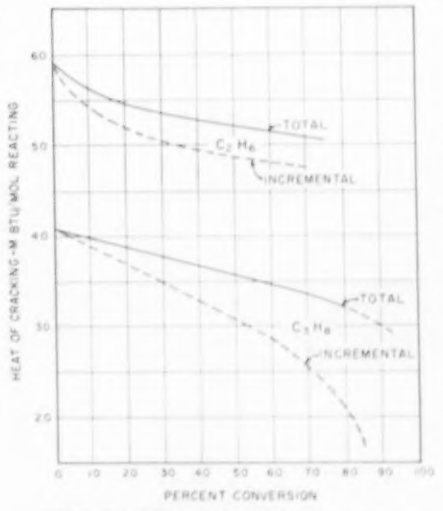
Heat of Reaction

The heat of reaction must be determined with reasonable accuracy not only for the postulated total conversion but especially for the differential reaction as the conversion progresses. This must be done in order to establish a basis for the optimum heat intensity in the zone of high conversion.

Fig. 9 shows the heat of cracking for ethane and propane as it varies


DANGER OF EXCESSIVE HEAT INTENSITY AT OUTLET
DANGER OF EQUILIBRIUM HINDRANCE AT OUTLET
MOST DESIRABLE
COIL OUTLET
TEMPERATURE - F
1600 1500 1400 1300 1200 1100 1000
30 25 20 15 10 5 0
TUBE NUMBER FROM OUTLET

TYPICAL TEMPERATURE GRADIENTS in the production of ethylene. Fig. 8.



HEAT OF CRACKING as function of conversion, in production of ethylene. Fig. 9.

with the conversion. The minimum heat input for the coil elements near the outlet can be determined in the course of time-temperature studies as outlined in the literature.[14 15] Table 12 gives some guiding values for the appropriate heat intensity in the zone of higher conversion for various feed stocks. The importance of reducing the heat intensity toward the coil outlet will be appreciated, when it is realized that the incremental heat of cracking toward the outlet of the coil decreases markedly and the reaction may even become exothermic for higher-molecular-weight charging stocks at high conversions.

Pressure Pattern

The pressure or pressure pattern throughout the pyrolysis coil will depend on coil outlet pressure, as well as the mass velocity of the reactant. The coil outlet pressure is normally selected at the start of the design and should be in the order of 5 to 15 psig. While a higher pressure may seem desirable in view of lower compression cost, it will impose increasingly severe limitations on the design and operation of the pyrolysis coil which will outweigh the savings in the compression.

Mass velocity . . . This also attains an optimum value when considering pressure drop, flow pattern, film heat-transfer rate, and tube-wall temperature. If the velocity is very high, the pressure drop will be high and the mean effective pressure in the conversion zone may become so high that the conversion products distribution and olefin yields are adversely affected. The conversions presented in Tables 1 and 2 (in Part 1 of this series, *The Oil and Gas Journal, February 13, 1956*) clearly indicate the effect of operating pressure. The rates of secondary or side reactions which are of second and higher order, are approximately proportional to the square or a higher exponent of the absolute pressure, and the permissible approach to equilibrium is reduced.

Higher pressure in the reaction coil means higher residence time, and the operating temperature level dictated by equilibrium consideration may not be obtainable. The length of the coil would then have to be reduced and the heat intensity increased correspondingly which will raise the film and tube-wall temperatures and the chances of coke formation.

Select outlet pressure carefully . . . The effect of the higher operating pressure can be counteracted by increasing steam dilution and thus reducing the partial pressure. However, this involves a reduction in cracking capacity and higher operating costs. Therefore, the selection of the coil outlet pressure should be given very careful consideration; increasing it will quickly meet a point of diminishing returns, especially when taking into account the sacrifice of flexibility in the pyrolysis coil operation.

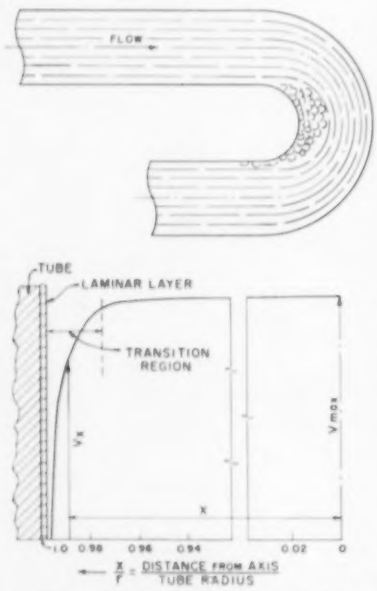
Fluid Dynamics and Heat Transfer

Fluid dynamics and heat transfer must be given consideration in arriving at the appropriate mass velocity, the upper limit of which is imposed by pressure drop or the mean effective pressure in the conversion zone, as discussed in the preceding paragraph.

No discontinuity . . . A continuous tubular reactor should not have any discontinuity in cross-sectional area, such as a sudden enlargement where stationary eddies would form and lead to prolonged residence time of some reactant particles, their complete decomposition and formation of coke.

Relatively high velocity . . . However, the velocity should be relatively high, not only to increase the film heat-transfer rate and lower the tube-wall temperature, but also to reduce the film area or fluid boundary volume where the velocity recedes from the average or maximum bulk movement to zero at the tube wall.

A low velocity also sets up a flow pattern in the return bend which has the same effect as the discontinuity in the cross-sectional area. A semidead space is formed on the inner side of the tube turn. Part of the reactant is there retained by back-whirl turbulence for a long enough time to effect overcracking, especially when the bend is located in the firebox and receives intense radiant heat.



FLOW PATTERN in tube and bend. Fig. 10.

Fig. 10 illustrates these critical flow phenomena. The thickness of the boundary layer and of the transition region where the temperature is higher than the temperature of the flowing mass varies with the velocity, and the general velocity distribution may be defined by the following equation:

$$V_x = V_{max}\,[1-(x/r)^2]^{1/7}$$

Importance of velocity . . . The combination of volume and elevated temperature determines the extent of side reactions which may lead to coke formation. The velocity will similarly affect the area of the eddy region or semidead space in the return bend. Therefore, the velocity is a primary factor with respect to the susceptibility of the reaction coil to coke formation and the degree of equilibrium approach.

Commercial Cracking Heaters

The pyrolysis furnaces in commercial operation are quite different in design, but most satisfactory performance has been obtained whenever thorough consideration has been given to the fundamental process variables and theorems of fluid flow and heat transfer as discussed above. In Figs. 11, 12, 13, and 14, four commercial installations are illustrated, and the heat intensity and temperature patterns are given.

Underdraft Furnace

The heater shown in Fig. 11 is a typical underdraft furnace originally designed for refining services, and it has been adapted to the cracking of ethane, propane, or a mixture of both. The modification of this commercial design for high-temperature pyrolysis consists principally in the disposal of the radiant tubes with respect to the source of heat and the tube spacing.

The section of the coil near the outlet where the reactant is in an advanced state of conversion is located in a milder heating zone, since it faces lower flue-gas temperatures than those prevailing in the combustion zone, and there is also less convection effect. The temperature pattern applies to cracking a mixture of 20/80 per cent ethane-propane at a coil outlet pressure of approximately 30 psig. With a mass velocity of 27.5 lb. per sq. ft. per second and conversion of propane in the order of 83 per cent, no rapid coke deposition is encountered and the coil is cleaned in a routine operational procedure every 4 months.

Updraft Furnace

Fig. 12 presents an illustration of a so-called updraft furnace in naphtha-cracking service. The heater accom-

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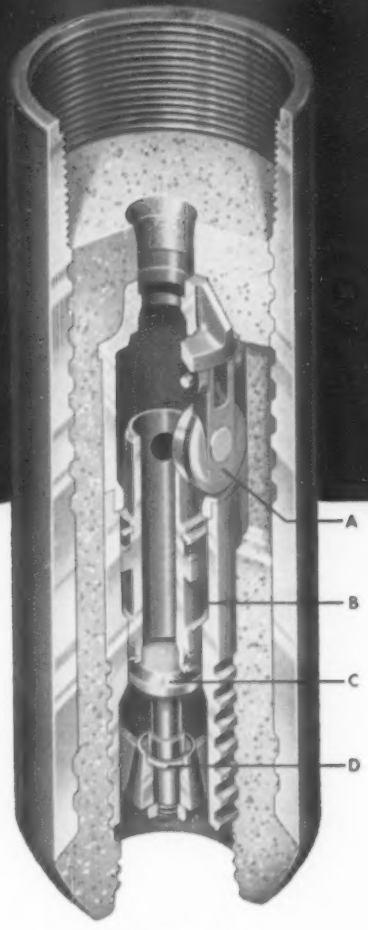

Baker DIFFERENTIAL FILL-UP Shoe, Product No. 1081.

A—Flapper Valve functions only at discretion of operator.
B—Sleeve Valve operates to control rate of flow and volume of "fill-up" fluid.
C—Sleeve Valve Seat.
D—Shear Ring is sheared. Flapper Valve now functions for floating or cementing.

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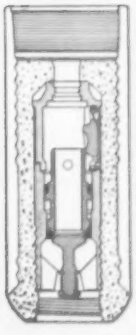
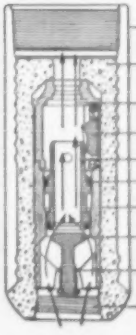
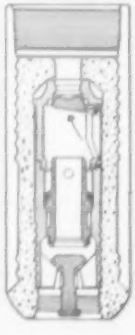


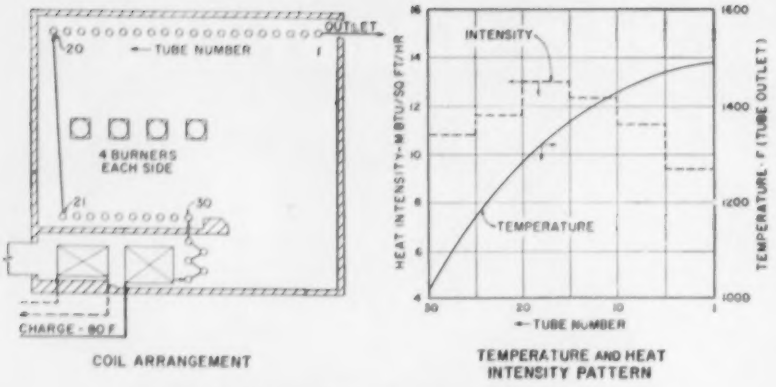
When running-in, the Sleeve Valve is in closed position in contact with the Sleeve Valve Seat. When the Sleeve Valve is in this position, fluid entry into the casing from below the valve is effectively blocked. The Sleeve Valve will be in the closed position whenever the height of the fluid column in the casing (the fill) EXCEEDS 90% of the height of the fluid column in the annulus.



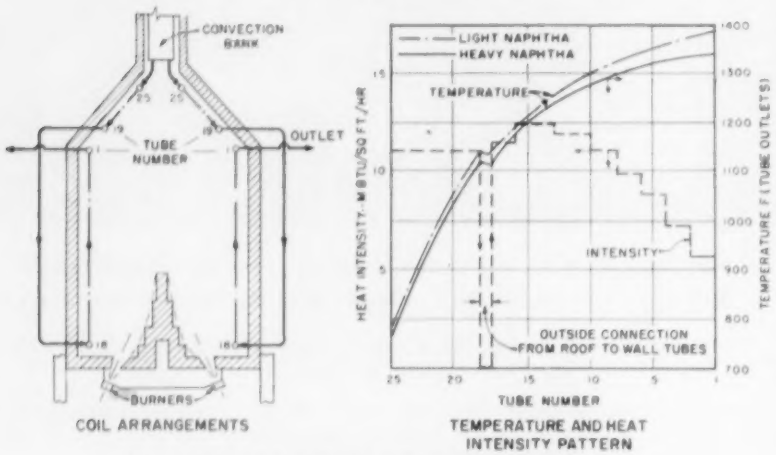
When the height of the fluid column in the casing (the fill) is LESS than 90% of the height of the fluid column in the annulus, the Sleeve Valve moves upward away from the Seat and permits fluid entry into the casing through the bottom of the FILL-UP Shoe. During the casing run, the Sleeve Valve opens and closes according to the pressures imposed on its top and bottom areas and thus automatically regulates the degree of fill.



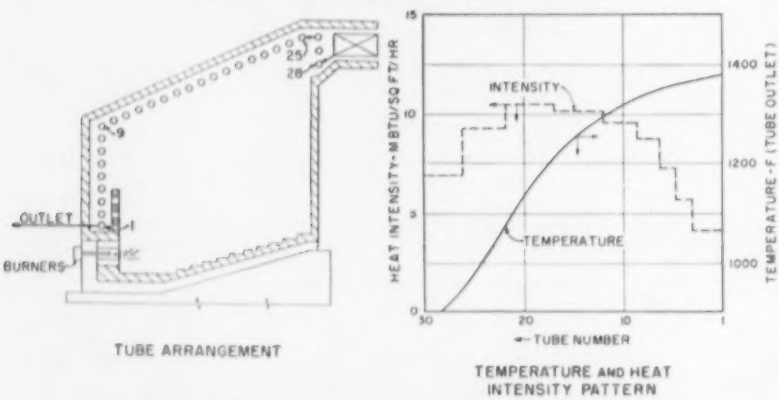
When it is time for cementing, pressure of approximately 1,000 psi is built up in the casing to shear the Shear Ring that holds the Sleeve Valve Seat in the supporting vanes of the Valve Cage. The Sleeve Valve can then move downward sufficiently to release the spring-loaded Flapper Valve, and thereafter the FILL-UP Shoe functions as a conventional Float Shoe.



UNDERDRAFT FURNACE, ethane-propane pyrolysis. Fig. 11.



UPDRAFT FURNACE, naphtha pyrolysis. Fig. 12.



SLOPING-ROOF FURNACE, heavy-naphtha pyrolysis. Fig. 13.

modates two parallel coils of the same length and arranged symmetrically with respect to the source of heat. The reactant is vaporized and heated to approximately 780° F. in the convection bank, then passes through tubes located on the sloping roof of the radiant section and subsequently flows upward through the wall tubes.

The burners, which are arranged in two rows over the whole length of the furnace floor, fire against the target wall to create high turbulence of the combustion gases and intensify the heat transmission to the lower section of the radiant wall tubes. The center wall in the combustion chamber also facilitates close temperature control of the individual coil outlet streams.

The configuration of the combustion or radiant chamber, combined with the arrangement of the reactant flow through the coils, creates a heat intensity pattern and a reactant temperature gradient conducive to long runs at high conversion for a relatively wide range of distillate feed stocks. Heavy naphtha is cracked at 15 psig. coil outlet pressure producing 58 wt. per cent of the C_4 and lighter fractions. The length of runs between decoking operations is in the order of 6 months, and the low rate of carbon deposition which is attributable to the favorable temperature and heat-intensity pattern, also results in long tube life.

Sloping Roof Furnace

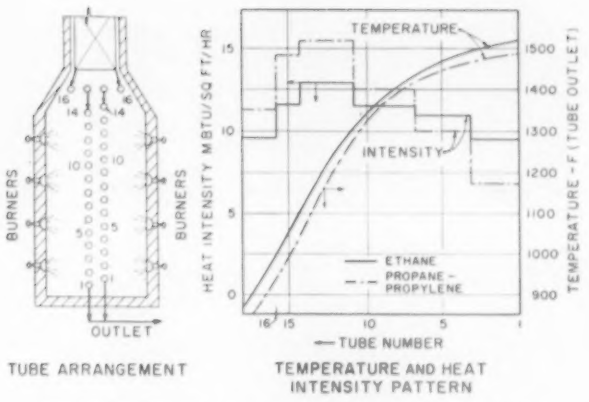
Another successful commercial design is illustrated in Fig. 13 and represents also an adaptation of a more or less conventional oil-refining heater to high-temperature pyrolysis. The radiant heat input is characterized by high heat intensity when bringing the reactant up to cracking temperature and during the initial conversion period. In the last section of the coil where the reactant is at an advanced state of conversion, a moderate heat-transfer rate is obtained.

The last 5 to 6 radiant tubes of the heater illustrated in Fig. 13 are partially shielded from intense radiant heat by a checkered wall which reduces the heat imparted to the reactant to a rate only slightly in excess of the heat of cracking. Combustion heat is produced through a multiplicity of small burners evenly distributed over the whole length of the furnace in order to effect an even heat intensity distribution over the whole length of the tubes.

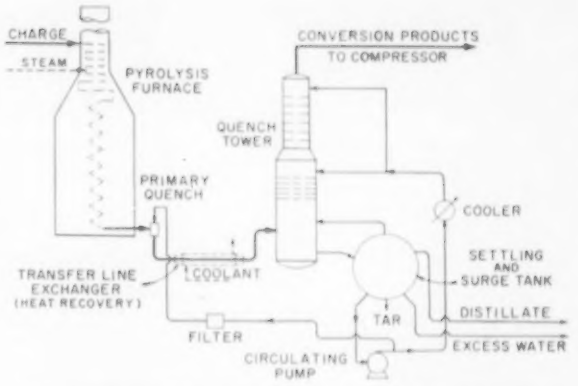
Designed for given feed stock . . . The heaters illustrated in Figs. 11, 12, and 13 are designed to produce a certain heat intensity and temperature pattern in accordance with the cracking characteristics of a given feed stock. The coil outlet temperatures may be varied to obtain the optimum or desired conversion, but the whole heat intensity pattern can not be materially changed by operational intervention, and the performance of the furnace on a feed stock greatly different from that for which the unit was designed may not be satisfactory as far as yields and length of runs are concerned.

"Temperature-Gradient" Heater

Fig. 14 presents an illustration of a heater which offers greater flexibility with respect to variation in feed stock and has in recent years come into wider use in hydrocarbon pyrolysis. It is known by the manufacturer's trade name as the Selas heater, and its performance in extremely high-temperature pyrolysis service is given in a recent article.[16] The heat input pattern over the length of the reaction coil can be varied according to cracking characteristics of the feed.



SELAS FURNACE, ethane and propane pyrolysis. Fig. 14.



WATER-QUENCHING SYSTEM, used to rapidly lower temperature of conversion products. Fig. 15.

Another advantageous feature of the heater is the uniform circumferential heat-intensity distribution on the radiant tubes, permitting a higher average heat-transfer rate for the same maximum local heat intensity as encountered in tubes disposed on the roof or walls of a conventional box-type heater. The importance of uniform heat intensity distribution in the practice of thermal cracking has long been recognized;[14] it will permit higher conversion and closer equilibrium approach in high-temperature pyrolysis.

While the Selas furnace offers means of varying the heat intensity pattern to suit different feed stocks, the coil design nevertheless requires the same careful consideration of reaction kinetics in conjunction with operating temperatures, pressures, and heat-transfer rates as a coil arranged in a conventional box-type furnace setting.

Quenching Conversion Products

Quenching of the conversion products or the rapid temperature reduction at the coil outlet is necessary in order to prevent loss of olefins due to secondary reactions; it is especially important if the pyrolysis coil is operated for the maximum ethylene concentration and equilibrium approach. The temperature of the furnace effluent is reduced to approximately 700° F. by injection of hot water which rapidly vaporizes through intimate contact with the high temperature gases.

Final cooling of the conversion products with condensation of heavy hydrocarbon fractions, as well as the major part of the process steam and primary quenching medium, is performed in a tower suitably equipped to offer intimate liquid-vapor contact and obtain a close temperature approach of the effluent gases to the cooling-water temperature. The water circulation in this tower is large by virtue of the high cooling duty, and efficient scrubbing action of the water will remove the major portion of tar or heavy distillate fractions from the pyrolysis products.

The quench water from the bottom of the tower flows to a settling tank which offers sufficient time for the separation of a tar heavier than water in the bottom of the tank and of an oil fraction which is lighter than water on the top to be skimmed off and pumped to storage.

Closed cycle . . . The water remains saturated with oil according to their mutual solubility characteristics. It is then cooled and recirculated to the quench tower or scrubber. This cooling circuit is frequently referred to as a closed-cycle water-quench system and has the advantage over an open or once-through water passage in that it avoids losses of gases and valuable conversion products, as well as the hazard of releasing such hydrocarbons in the general cooling-water effluent main or in a cooling tower.

The oil content of the circulating quench water is relatively high, but with the proper provisions for oil and tar separation in the settling tank and for filtering of the water, no rapid buildup of carbon or scale deposits to the detriment of continuity of operation has been experienced.

Heat reclamation . . . The quench system just described is shown schematically in Fig. 15. When it is realized that a large amount of heat is simply removed by cooling water and thus wasted, the question of heat preservation arises. Recovery of a large portion of the heat in the pyrolysis coil effluent is possible and practical, and most installations in Europe where fuel costs are very high have provisions for such heat reclamation. From a rational economic standpoint, recovery of this heat is well justified also in installations in this country.

Transfer-line exchanger . . . As indicated in Fig. 15, the furnace effluent flows immediately through a transfer-line heat exchanger located adjacent to the pyrolysis furnace. The basic principle to be observed in the design of this apparatus is rapid cooling of the reactant which means relatively high mass velocity, but at the same time maintaining a film and outlet temperature above the dew point of the reactant by an appreciable margin.

The cooling medium may be boiling water to generate directly high-pressure steam in cases where the conversion products contain practically no tar, or it may be heat carriers, such as Dowtherm, Fluoranthrene, and methyl naphthalene, where a high film temperature has to be maintained due to the presence of relatively large amounts of high-boiling liquid fractions. The heat carrier is then circulated through a high-pressure steam generator.

The composition and physical properties of the liquid fractions produced in the pyrolysis of various feed stocks must, of course, be known in order to determine the theoretical dew point of the coil effluent. The minimum temperature to which the reactant may be cooled should be considerably higher than the calculated dew point in order to maintain heat transfer efficiency over long periods of continuous operation, preferably synchronized with the length of run of the pyrolysis coil.

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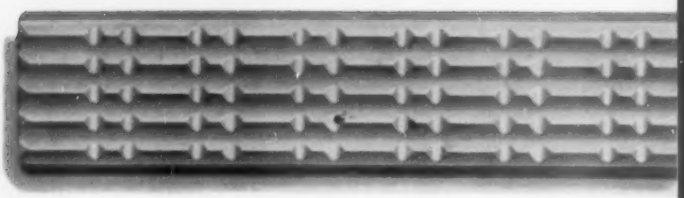

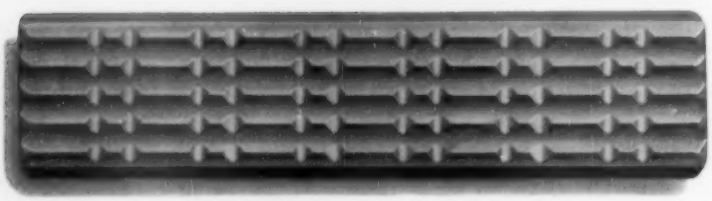

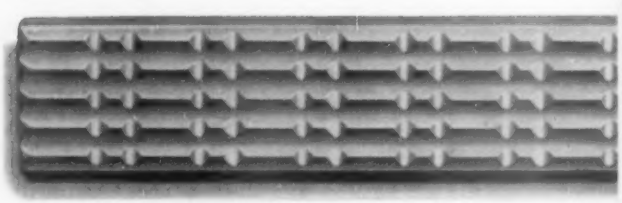

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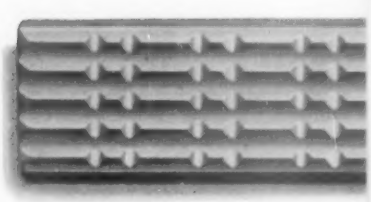

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. . . That's the three-way goal of L. A. refinery managers for their plants. And teamwork is bringing about economical air-pollution control there

by D. H. Stormont
District Editor

HARASSED oil-refinery managers, in the public eye for 8 years in smog-ridden Los Angeles agree on two things:

1. The smart thing to do in Los Angeles is to try and operate a refinery so it can't be seen, can't be heard, and can't be smelled.

2. Expensive air-pollution-control devices alone won't do the job. The human side of the problem is just as important as the "plumbing," maybe more so. Everyone in the plant—from assistant manager to unit operator—has to be sold on the importance of good air-pollution control before the "no smell, no see, no hear" goal can be reached.

But Los Angeles refinery managers, interviewed in a survey, aren't complaining about this "human engineering" job. They feel this route will get them out of the public eye quicker than any other. One refinery manager, putting it quite bluntly, declared:

"Regardless of the equipment used, solution of the problem depends on the employes' actions. People on the job really determine whether or not a refinery stinks."

Others point out that the program involves no trips to the home office with requests for large capital expenditures. It has a high payout and yields measurable benefits in better public relations, improved employe morale, and reduced fire hazards. Better maintenance also results.

Refineries criticized . . . Since 1948 oil refineries have been publicly blamed by many people for all or a greater part of the responsibility for Los Angeles smog. Scientific research has proved otherwise, and besides, $30,000,000 in air-pollution-control equipment has greatly reduced the comparatively small amount of pollutants for which refiners admit they were responsible. Industry spokesmen have persistently contradicted the exaggerated claims about refineries' share of responsibility for smog.

Nonetheless, smog-sensitive residents are still quick to criticize oil refineries. Air-pollution-control officials in Los Angeles, alert to public opinion, have 17 of its more than 70 inspectors permanently and solely assigned to checking on refineries.

One refinery manager summed up the situation this way:

"My foremen are sick and tired of hearing me talk about air-pollution control. But if an operator makes a mistake and produces a billow of black smoke, I go to court . . . and I don't like it. So I keep right on talking!"

Another manager added:

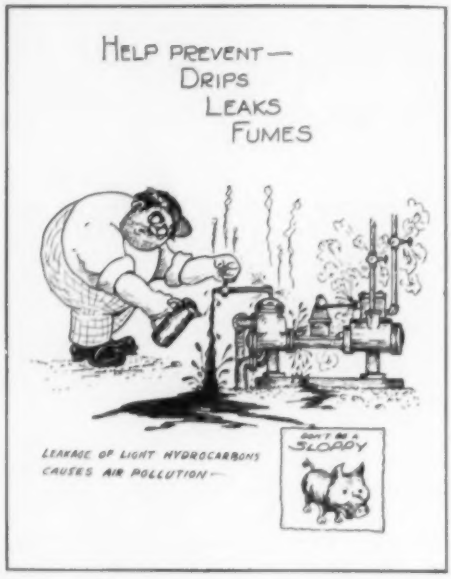
"There's an awful pressure drop in the line of communication between my desk and the men running the units. I've got to make the men on the units understand that smoke and odor con-

How effective is your control program?

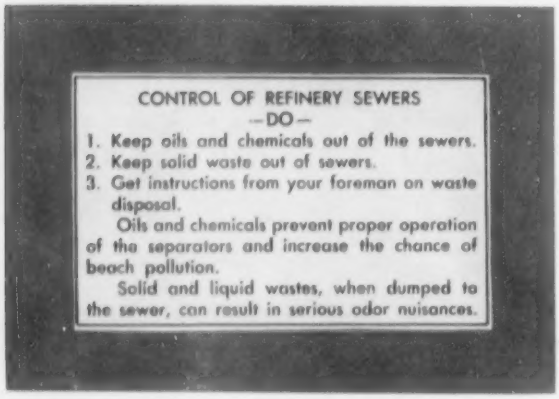
If you answer "yes" to these 15 questions, your program is probably adequate—and relations with your downwind neighbors are most pleasant.

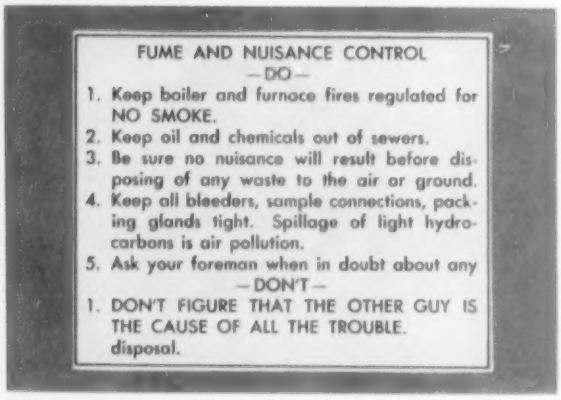
1. Do you regard odors, smoke, hazes, and plumes as important factors in causing the public to believe refineries are a major source of air pollution?
2. Are your plant personnel trained to be air pollution conscious in their daily work?
3. Do you distribute booklets or other printed material on air pollution to keep them aware of the problem?
4. Do you have an adequate preventive-maintenance program for leaks?
5. Have you taken steps to wipe out open sludge pits and other such odor sources?
6. Are you taking steps to keep the amount of oil and products entering sewers to a minimum?
7. Does air-pollution control appear regularly on your management meeting agenda?
8. Do you regularly check as to whether control equipment is being operated correctly, odor controls are effective, and that all rules are being carried out?
9. Is there a proper organization or chain of command for carrying out these controls?
10. Do you **personally** give talks to foremen, operators, maintenance groups, and others on the importance of the problem?
11. Are new ideas in air pollution control being watched for by your technical people, and possible applications to your plant being studied?
12. Have you made any effort to find out how people near your plant feel about air pollution control performance?
13. Do you give proper consideration to nearby residents when they complain of odors and smoke?
14. Do you work with air pollution control authorities on a friendly, cooperative basis.
15. Do you have an air-pollution-control "audit" regularly?

These reminders help to keep employes air-pollution conscious . . .



POSTERS . . . Here are specimens of those used by Standard of California.


CONTROL OF REFINERY SEWERS
—DO—
1. Keep oils and chemicals out of the sewers.
2. Keep solid waste out of sewers.
3. Get instructions from your foreman on waste disposal.
Oils and chemicals prevent proper operation of the separators and increase the chance of beach pollution.
Solid and liquid wastes, when dumped to the sewer, can result in serious odor nuisances.


FUME AND NUISANCE CONTROL
—DO—
1. Keep boiler and furnace fires regulated for NO SMOKE.
2. Keep oil and chemicals out of sewers.
3. Be sure no nuisance will result before disposing of any waste to the air or ground.
4. Keep all bleeders, sample connections, packing glands tight. Spillage of light hydrocarbons is air pollution.
5. Ask your foreman when in doubt about any
—DON'T—
1. DON'T FIGURE THAT THE OTHER GUY IS THE CAUSE OF ALL THE TROUBLE.
disposal.

CARDS . . . Reminders like these are given to all employes.

SIGNS . . . These serve to inform as well as to remind.

It Can't Happen Here?

"Use of industrial equipment valued in excess of $9,000,000 was denied Los Angeles Basin industry by engineers of the Air Pollution Control District during the month of February.

"Permission to construct or to operate this equipment was refused because it failed to meet the standards of the district's rules and regulations. Each month equipment of similar valuation is kept from adding pollution to the already overburdened atmosphere."

Air Pollution Control District "Report," April, 1956.

trol are important, not only to me but to them and to the whole company."

By hit or miss, the five largest refineries in the Los Angeles area have all come to roughly the same methods for handling this problem. The method involves:

1. Personal participation by the refinery manager.

2. Appointment of a pollution-control coordinator, an able engineer long on tact and diplomacy. He reports "high up" on the plant's organization chart and has ready access to the manager.

Los Angeles refinery managers agree: "We want the public to ignore us." Getting everyone in the plant—from assistant manager to unit operator—on the air-pollution-control team is helping win this objective, and at low cost.

What the managers do . . . Here are some of the ways Los Angeles refinery managers have found they can keep up interest in air-pollution control throughout the plant:

1. Schedule air-pollution control for discussion at every management and staff meeting.

2. Start an information program for all plant employes. Show films on the smog problem, include news about new air-pollution-control devices in letters and talks to employes, post notices of violations of smog laws on bulletin boards, distribute all company statements or publications on the smog problem to employes' homes.

3. Personally inspect the plant regularly, looking for odors, leaks, plumes, etc.

4. Arrange that every unit operator send directly to the manager's office a written report on every bad smoke plume, explaining how it happened.

5. Solicit suggestions for better methods of handling odor-producing materials. Solicit employes' ideas on air-pollution-control methods and practices. As the program progresses, more and more suggestions come from the bottom up.

6. Keep an ear to the ground in nearby communities for adverse comments by residents. Pass on what you hear to plant foremen.

7. Give the air-pollution-control coordinator full support. Arrange to have copies of all of the coordinator's inspection reports sent to the manager's office. Let this be known widely in the yard.

8. Encourage employes to talk to their friends and neighbors about the plant's air-pollution-control program. (If they talk about it they'll make it work.)

9. See that air-pollution control is stressed during training of operators. See that it is written into a foreman's job description as one of his responsibilities. See that air-pollution control is written into procedures for vessel inspection, maintenance, and shutdowns.

10. Conduct a regular "audit" on air-pollution-control practices and procedures. Keep a constant check on how odor-producing chemicals are disposed of.

11. See that odor control, smoke control, and noise control specifications are written into the specifications for any new refinery units.

Pollution-control organization . . . The organizations for carrying out air-pollution-control programs are quite similar in all the large Los Angeles area refineries. The same man or men are also charged with policing waste water, an equally important problem in a metropolitan area like Los Angeles.

It is important, the managers agree, that the pollution-control man report to the refinery manager or assistant manager. Personnel of the department in most cases is kept flexible, with most of the actual work being done by other departments on a loan basis.

In the case of Standard Oil Co. of California at its El Segundo plant, some eight or more people are engaged full time on the project. They include researchers from its subsidiary California Research Corp., but mostly they are from the control laboratory and engineering department. All operating personnel devote a portion of their time to air-pollution control.

Union Oil Co. partially staffs its department with personnel from the control lab and other departments. In addition all foremen are rotated from their regular duties to air-pollution-control work. In this way they gain first-hand knowledge of the effort management is making.

Duties of the groups follow from the 11 aforementioned manager's duties. They keep on top of the problem, establish and evaluate control methods, and locate and control sources of air pollution. In particular they periodically:

. . . make checks of all pumps and valves for leaks.

. . . survey all stacks to determine their contaminant content.

. . . conduct surveys of hydrocarbon losses from all sources.

. . . and, most of all, work with the foremen and operators in educating all personnel to be air-pollution conscious in their work.

The department head deals directly with air-pollution-control officials when they visit the refinery. He conducts the many surveys they request, and prepares the numerous reports which must be filed.

Greatest benefit of the control group possibly is its effect on plant personnel. Its existence emphasizes that management is sincere in its efforts to prevent air pollution. Their constant appearance around the plant helps to reduce the "pressure drop" which occurs between top management and down-the-line employes.

Improved maintenance also results, particularly insofar as pump leakage is concerned. This was stressed by Richfield Oil Corp. Its operators are instructed to immediately shut down a pump when it starts leaking, then call to see about getting it repaired.

Pollution-control ideas . . . Here are some of the ideas for air-pollution control which have grown out of this teamwork of engineers and operators, and the conviction of managers that it is profitable to operate "no see, no hear, no smell" refineries.

In the belief that visible emissions of any form—including those of exhaust steam—attract public attention, effort has been made to eliminate them.

. . . Cat cracker plumes, caused by moisture condensation above the stacks, have received particular attention. All regenerator stacks are preceded by cyclones and electrical precipitators so the problem is not one of keeping catalyst fines within the 40-lb. per hour limit established by the Air Pollution Control District. Hydrocarbon content is low—down in the p.p.m. range.

During periods of low humidity the stacks show no signs of plumes. But on cool, damp days a plume may appear, or a detached cloud will form some 50 to 500 ft. from the top of the stack.

The problem is one of moisture condensation, but refiners are subjected to complaints from control inspectors and the public. Analysis of the stack discharge confirm this condition. But because the plumes (which in reality are only clouds) do not dissipate, and when viewed from certain angles take on a brownish cast, effort is made to keep the discharges invisible.

Degree to which refinery managers have become plume conscious can be illustrated by one cat cracker operator's remarks: "There was a time when if the boss called his first question always concerned the conversion effi-

ciency. Now it's more likely to be 'What's causing that plume.' And it will be followed by a remark to the effect he would be greatly pleased if it immediately disappeared."

Plants closest to the ocean have the greatest problem. In two cases it was solved by adding an afterburner or "sky heater." These keep the exhaust gases hot, raising them to some 500° or 800° F. Discharged into the atmosphere at high temperatures they have a much better opportunity to dissipate before condensation occurs.

An added benefit of the heaters is that the higher temperatures result in approximately 25 per cent of the contaminants being burned.

Operation of the burners is dependent on weather conditions. Only during cool mornings and periods of high humidity is it necessary to operate them at maximum temperatures. Careful attention to weather and humidity conditions is observed for this reason.

Other means of suppressing regenerator stack plumes include keeping the moisture content down. The higher the moisture content the greater the plume will be. For this reason the volumes of steam used to control regenerator temperatures are cut to a minimum. It also has been found beneficial to keep down the volume of air injected.

...Stack smoking has been curbed principally through careful operation of the units. Smoke indicators, recorders, and alarm devices have been installed on the stacks of a variety of equipment. Natural-gas use is maximized. Only when gas supplies are halted due to cold weather are any considerable amounts of fuel oil used for process heating and steam generation.

If fuel oil is burned, only best grades of commercial fuels are used. Air-fuel ratios and stack temperatures are adjusted to secure best possible combustion. Under these conditions the switch from gas to fuel oil is made without any smoke being emitted.

...Steam plume elimination currently is being given much study at all large plants. Though the program is aimed at improved public opinion, in a surprising number of cases it has been found economically feasible.

In some instances steam plumes are done away with through electrification. Motor-driven equipment is substituted for steam-driven reciprocating pumps. Usually, however, some use can be found for the steam within the unit process, in a nearby plant, or it can be tied into the condensate return line to the boilers. Piping costs generally rule out the move as an economy measure. On the other hand, uses have been found which afforded payouts of a few months to 2 years.

Odor abatement . . . Through careful handling of streams containing mercaptans and H_2S, use of covered skimming pits and sumps, attention to leaks, and generally improved plant practices, Los Angeles refineries are the most odor-free in the industry.

They did not become this way overnight. It came about through management's constant harping on the subject for several years. Offensive odors have been cut out one by one. Elimination of one quite often resulted in another being uncovered which had been masked by the first.

The problem differs from refinery to refinery, since different processes are involved. In general, however, the steps taken include:

...Foul waste waters are steam stripped before being disposed of. In some instances the vapors then are burned in a high-temperature heater. In one plant they are condensed, and charged to the hydrogen-treating section of a catalytic reformer. Hydrogenated to H_2S, they then are united with other streams and run to a sulfur recovery plant.

...Mercaptan solutions and other smelly streams are particularly watched. Seals of pumps in such service are closely checked for leaks. In an effort to completely eliminate the possibility of pump leakage, tests with diaphragm pumps and magnetic coupling pumps are being carried on.

...Spent caustic solutions are disposed of by various means. Where no odor problem is involved they can be used for neutralizing low pH waters. One operator has solved the problem by oxidizing them to sodium thiosulfate, which can be discharged into the sewer without harm. Others have the solutions hauled to sea where they are dumped. Since a change in their acidity results in H_2S being given off, none is allowed to be spread around the plant.

...Acid treating of distillate products has been largely discontinued and burning of spent acid sludge stopped. Now where treating with sulfuric acid is employed, the spent acid is converted to ammonium sulfate, run to sulfuric acid plants, or disposed of in some manner without releasing sulfur dioxide to the atmosphere.

...Oxidizing air from such processes as cresylic acid and Solutizer plants are run to the fireboxes of nearby heaters. There the hydrocarbon vapors or sulfur fumes are incinerated.

...Sewers are closely policed. All personnel are carefully instructed as to what wastes can be disposed of in them. Spent catalyst, scales, and other materials containing hydrogen sulfide are kept out. The amount of oil being recovered at the separators is closely watched.

...Open skimming pits and basins which have become oil-soaked or smelly through years of use have been filled with fresh earth.

Sound suppression . . . At plants surrounded by residential areas, the teamwork effort has been extended to sound suppression.

An outstanding example is Standard of California's experience with its cat cracker regenerator stack. Soon after the old stack had been replaced by the one equipped with an afterburner, the company began receiving complaints from nearby residents that on certain nights their homes were vibrating.

Everything pointed to the new stack as the cause, but engineers were unable to discover the reason. After hundreds of man-hours were spent in investigating the condition it was definitely determined that the afterburner was creating vibrations which were being magnified in the stack. Actual solution proved to be simple—the burner tip was replaced with a new one.

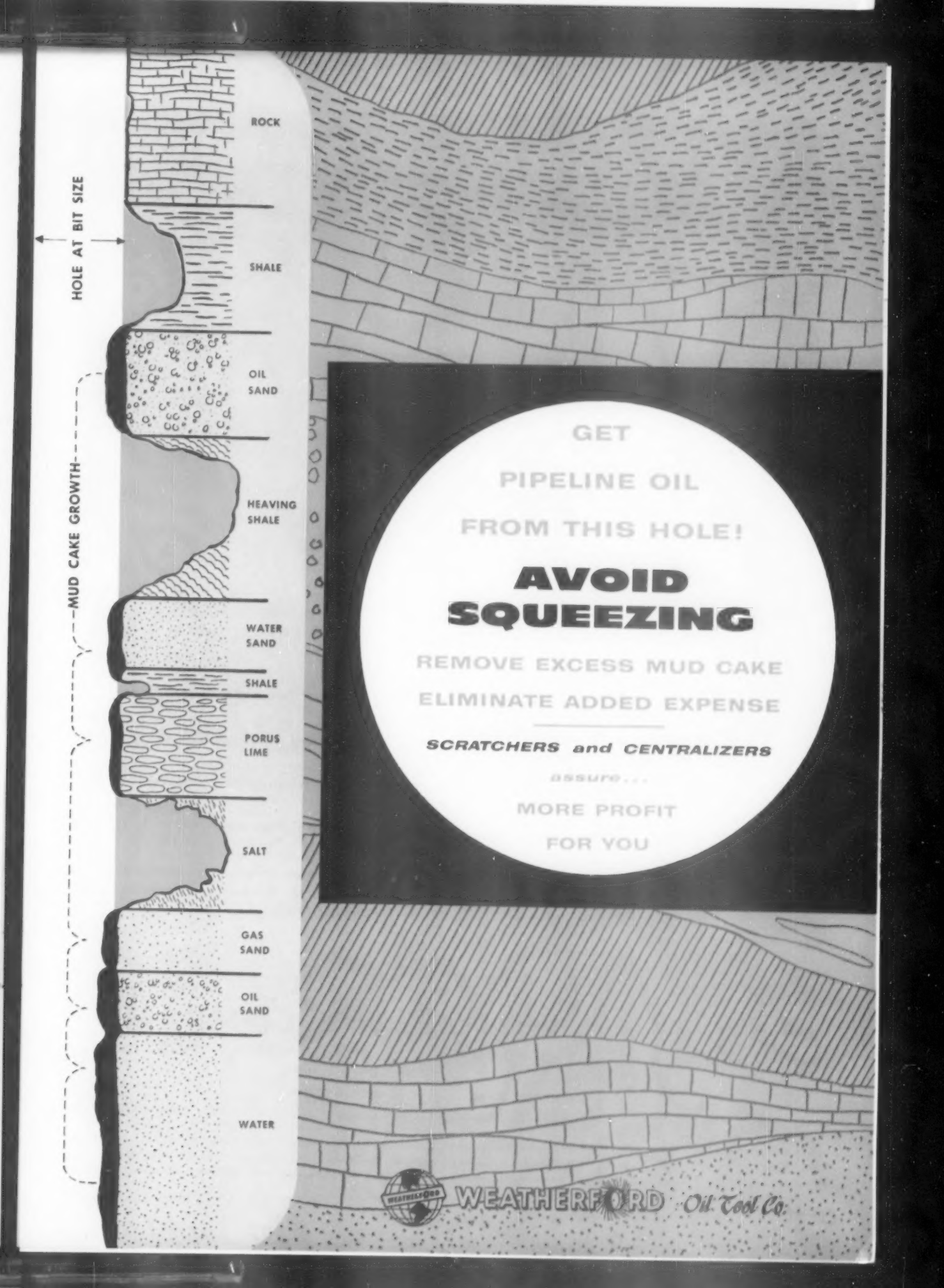
As a gesture to nearby residents the company has designed a silencer head for reciprocating steam pumps. A silencer is used on the air suction to the blower serving the catalytic cracking unit. Work on quieting heater burners, which tend to be particularly noisy when low-B.t.u. gas is burned, is under way. Likewise, the company is seeking to suppress turbine noises, through studying and changing piping which serves the units.

Handling complaints . . . As in the instance just cited, all companies give proper consideration to any complaints from nearby residents. If possible, a personal visit is made to the complainer's home as it offers an opportunity to inform the public just what is being done to prevent air pollution.

The refiners also are striving to be equally cooperative with air-pollution-control inspectors when they are attempting to trace down a complaint turned in by a downwind neighbor. If certain control equipment must be temporarily down for repairs, or other occasions arise which result in contaminants being flared, Control District officials are notified in advance. When they know what conditions are, pollution-control personnel usually prove equally cooperative.

In brief, Los Angeles refiners feel they have nothing to hide. They are operating in compliance with all air-pollution-control regulations and are making an honest effort to be good neighbors.

They believe they have a good story to tell, and are more than willing to tell the public about it.


HOLE AT BIT SIZE
MUD CAKE GROWTH
ROCK
SHALE
OIL SAND
HEAVING SHALE
WATER SAND
SHALE
POROUS LIME
SALT
GAS SAND
OIL SAND
WATER
GET
PIPELINE OIL
FROM THIS HOLE!
AVOID SQUEEZING
REMOVE EXCESS MUD CAKE
ELIMINATE ADDED EXPENSE
SCRATCHERS and CENTRALIZERS
assure...
MORE PROFIT
FOR YOU
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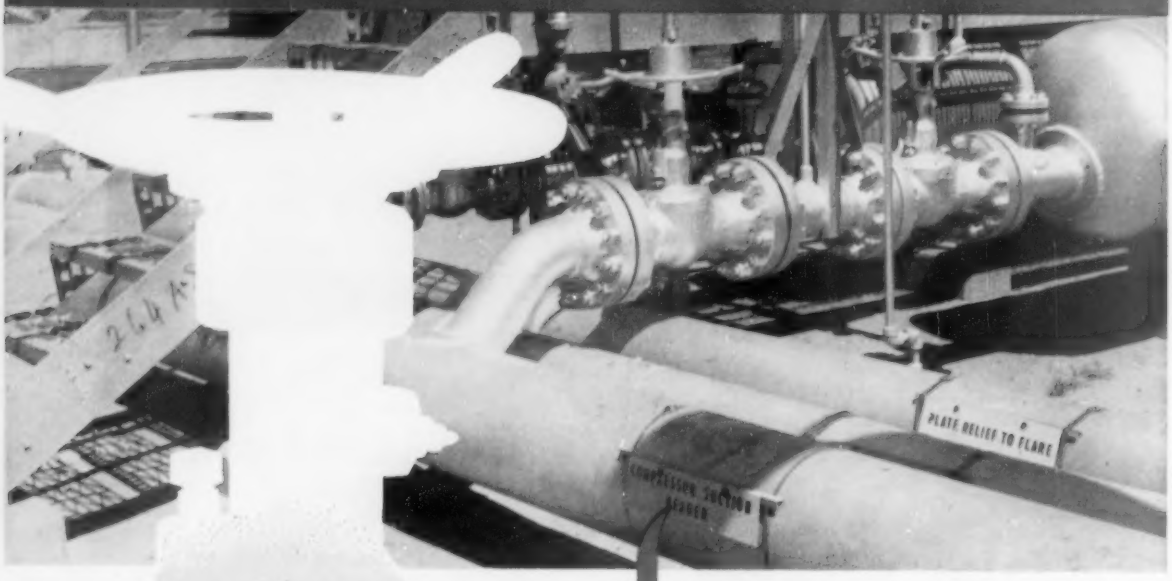
NEW PROCESSES — NEW APPLICATIONS



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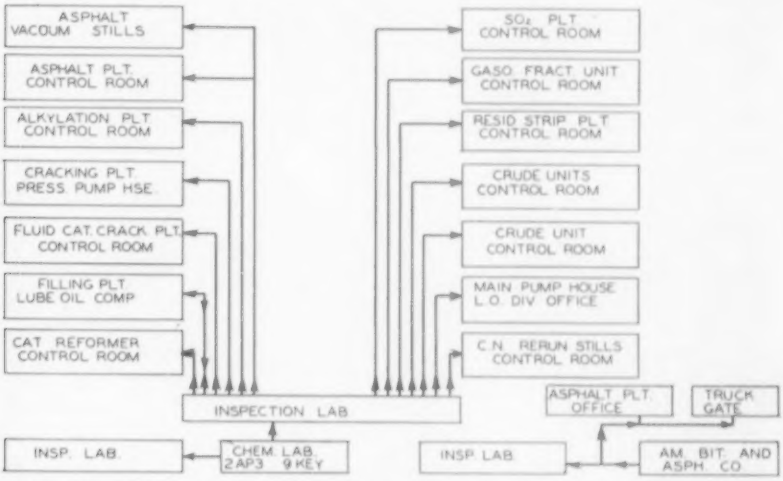
TELESCRIBER INSTALLATION at El Segundo refinery (in the control laboratory).


ASPHALT VACUUM STILLS
ASPHALT PLT. CONTROL ROOM
ALKYLATION PLT. CONTROL ROOM
CRACKING PLT. PRESS. PUMP HSE.
FLUID CAT. CRACK. PLT. CONTROL ROOM
FILLING PLT. LUBE OIL COMP
CAT. REFORMER CONTROL ROOM
SO2 PLT. CONTROL ROOM
GASO. FRACT. UNIT CONTROL ROOM
RESID. STRIP. PLT. CONTROL ROOM
CRUDE UNITS CONTROL ROOM
CRUDE UNIT CONTROL ROOM
MAIN PUMP HOUSE L.O. DIV. OFFICE
C.N. RERUN STILLS CONTROL ROOM
INSPECTION LAB
ASPHALT PLT. OFFICE
TRUCK GATE
INSP. LAB.
CHEM. LAB. 2AP3 9 KEY
INSP. LAB.
AM. BIT. AND ASPH. CO.

HOW IT WORKS is shown in this diagram. Receivers are installed at 13 different units. The receivers are connected to transmitter-receiver stations in the control lab.

How telescribers aid product control

. . . at Standard of California's El Segundo refinery

by D. H. Stormont
District Editor

ERRORS inherent to sending and receiving laboratory analysis data by telephone are eliminated at the El Segundo refinery of Standard Oil Co. of California.

All data from the product control labs are transmitted to the various process control rooms by means of telescribers. These instruments permit handwritten messages to be instantaneously and accurately reproduced at one or several distantly located receivers.

Besides being a faster means of communication, the telescriber removes the possibility of figures being transposed—an all too frequent occurrence in telephoned messages. Likewise, an operator or still man does not have to answer the phone when a situation demands his presence elsewhere.

Setup of the telescriber system used at El Segundo is shown in the accompanying diagram. Receivers are installed in the control rooms or pump houses at 13 different units where product control is required. Using existing telephone wires, these receivers are connected to two transmitter-receiver stations in the control laboratory.

In the sections where physical tests—such as gravity, distillation, etc., are carried out—there is a 13-station unit. In those where SO_2, aromatic content, and other chemical properties are determined, there is a nine-key sender-receiver, but only six are being used.

Samples of products on which tests are desired are brought to the control lab. The specific tests to be run are checked off on a form attached to the bottle.

As soon as the tests are carried out, the information is passed to the telescriber operator. By pressing the proper selector key, the data he places on the sending instrument is immediately recorded on the receiver at the control room from which the sample originated. If additional tests are required in the chemical section of the laboratory, the sample is sent on to that department. It then reports its data direct to the control room.

To prevent both stations from attempting to send to the same receiver at the same time, depressing of the selector key at either station automatically locks out the other.

As is shown on the diagram, there is a four-station telescriber circuit in the adjacent asphalt plant of American Bitumuls & Asphalt Co. The two systems are not interconnected, however.

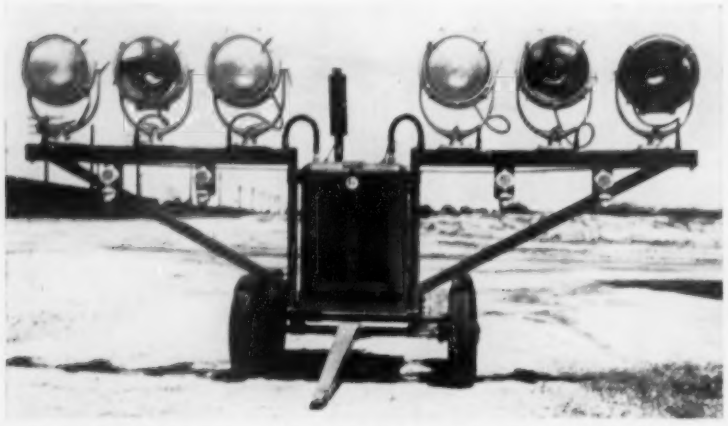
Rolling storeroom stocks insulation

THIS insulation van has proved its worth in a large refinery. It consists of a reconditioned drop-frame furniture van 28 ft. long which was purchased and equipped with wood racks for the storage of preformed and other

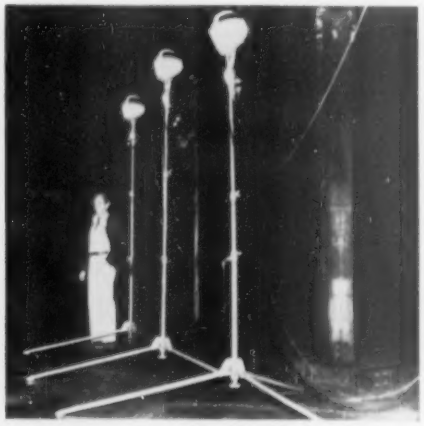
types of insulation employed in a refinery.

The van is used primarily during turnarounds of operating units when considerable insulation must be removed and replaced on operating lines and equipment. It is kept stocked with required sizes of insulation and is moved by tractor from unit to unit as required.

Much waste and deterioration of insulation is avoided by reducing added handling and storage at various points throughout the plant. Delivery time during turnarounds is expedited by locating a complete inventory of needed insulation at the job, to be withdrawn only as needed.



PORTABLE GENERATOR and six explosionproof floodlights comprise mobile unit used during tank cleaning and repair operations at Sohio's Covington plant.



BATTERY OF FOUR explosionproof lights connect to generator for use inside tanks.

Sohio's experience shows how . . .

Portable floodlights speed maintenance

PORTABILITY is the key to the efficient floodlighting used at Sohio Petroleum Co., Covington, Ky., to provide safe, adequate lighting during cleaning or repair operations of refinery storage tanks and other structural equipment.

Designed by T. L. Clift, electrical and instrument engineer at the Covington refinery, two portable floodlighting setups are extensively used.

For emergency lighting and as a source of illumination for general outdoor-maintenance work, Sohio employs a 7.5-kw. portable generator equipped with six Crouse-Hinds nonexplosionproof floodlights. Three floodlights on each side of the generator are mounted on wing girders. By positioning the portable power unit between two refinery tanks, and leaving the wing girders in a closed position, lighting is provided for two maintenance crews. By swinging the girders out a full 90°, a lighting bay is formed that delivers 35 foot candles of light over the surface of an object 50 ft. away. The three wide-beam floodlights deliver 5 foot candles of light over an area 60 by 60 ft. And the three narrow-beam units emit 30 foot candles of illumination over an area 20 by 20 ft.

This combination illuminates the entire side of a refinery tank by providing adequate lighting in the general work area as well as by pinpointing extra light over specific repair areas. Floodlight elevation angle is adjusted by loosening and resetting the trunnions of each floodlight.

The generator also is equipped with four explosionproof plug receptacles to feed power to other electrical equipment at the refinery, such as the battery of four explosionproof floodlights used during cleaning operations to illuminate the interiors of refinery tanks. To provide extra strength and durability, flexible couplings, condulets, and rigid conduit connect the plug receptacles to the generator's outlet circuit.

When in use, refinery tanks at Sohio contain crude oil and petroleum products, such as kerosine and naphtha. Ranging in size from 20 to 100 ft. in diameter and from 20 to 50 ft. high, the tanks are regularly cleaned, inspected, and repaired.

Ordinary floodlights are not used due to the volatile air-solvent mixture still present in the tanks after emptying but before cleaning.

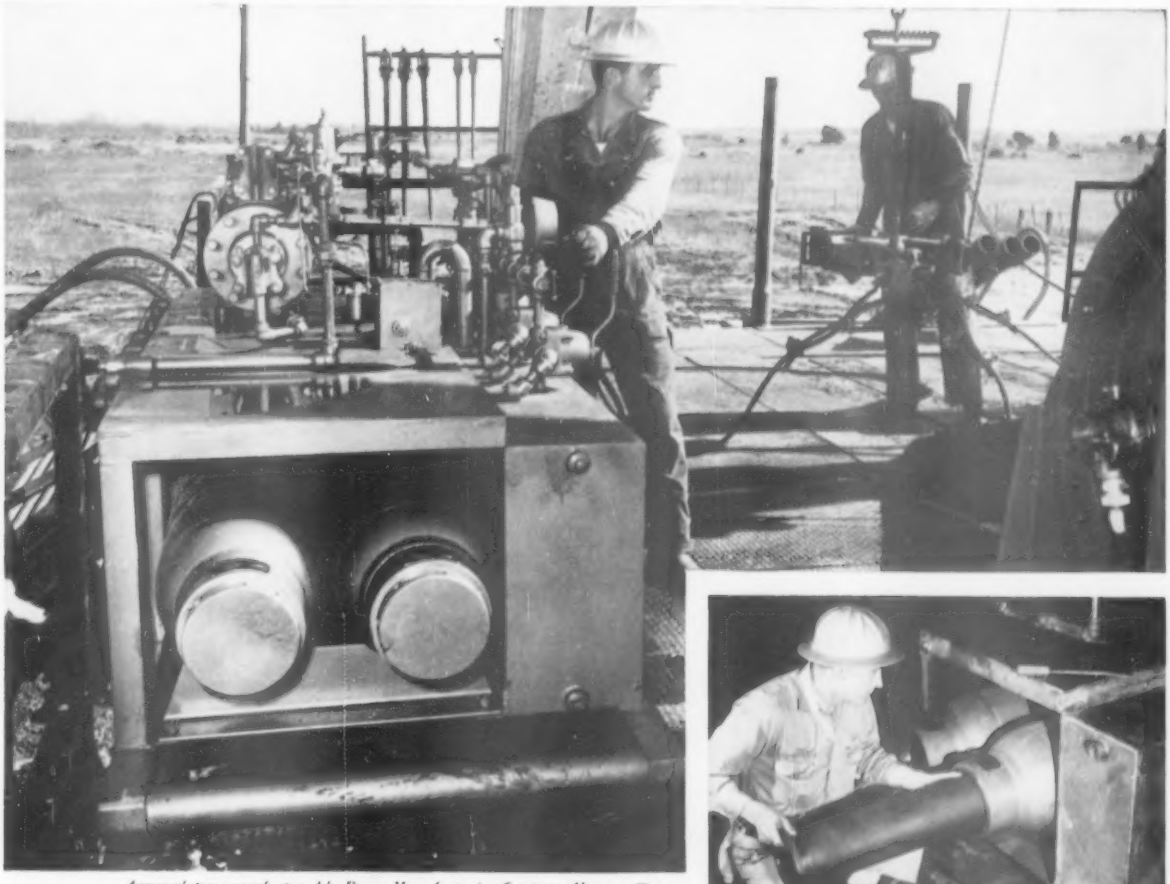
Explosionproof floodlights provide safe illumination during these maintenance operations. Approved for use at Class I, Group D locations, the cast-aluminum fixtures are sturdy yet lightweight. Each floodlight is mounted on an aluminum-tubing tripod that supports the floodlight 5½ ft. above the ground when retracted and 10 ft. when extended.

Outside the tank, power to the floodlights is fed by cable from the portable generator through a manhole in the top of the tank. The leads to the floodlights are vulcanized to the generator cable by means of a Joy Manufacturing kit. This arrangement prevents the lead wires from dragging along the tank floor or from tripping the workmen.

By arranging a battery of four floodlights in the center of the tank floor, workers can thoroughly wash down one wall section at a time. After the wall section is cleaned, intensity of the floodlights is high enough to allow the section's seams to be thoroughly inspected and, if necessary, repaired.

Another new development using

B. F. Goodrich Chemical *raw materials*



Accumulators manufactured by Payne Manufacturing Company, Houston, Texas.
Hycar bladders by F. H. Maloney Company, Houston, Texas.

HYCAR STANDS BY TO STAND OFF BLOWOUTS

CYLINDERS made from Hycar nitrile rubber act as pistons inside the pressure accumulator of this blowout preventer. Hycar has to take unusual punishment to keep the blowout preventer on the job—ready, in case of rig power failure, to deliver a 2,000 psi punch to close off high pressure gas blowouts.

First, the Hycar bladders are pumped full of nitrogen to 1,000 psi. Then hydraulic fluid is pumped into the steel cylinders around the Hycar bladders until the pressure is 2,000 psi. This pressure is then always ready to operate the blowout seal-off—fast!

This is one of the toughest tests of Hycar's performance. It must withstand very high pressures, yet have the elasticity to inflate like a balloon. It must have toughness and abrasion resistance to take the scraping it gets from metal parts when pressure is suddenly released. And it must resist the deteriorating effect of the hydraulic oil.

Many, many different characteristics can be built into products made from Hycar. The properties described here and many others often make Hycar the unique material that is the answer to design problems. For information on how Hycar can help with your particular requirement write Dept. EN-3, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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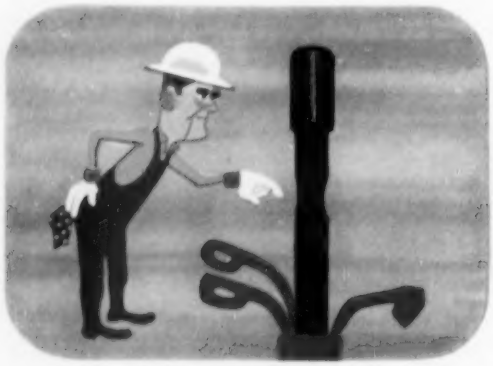
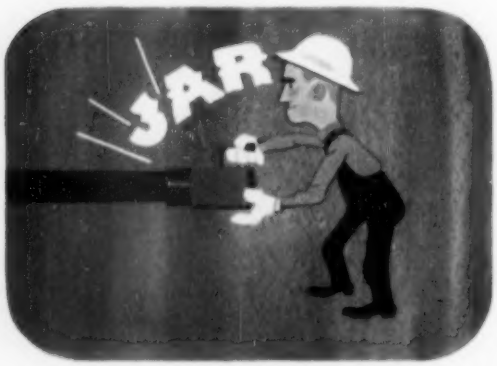
. . . right at the

Take a look at the tool joint that's right for your rig

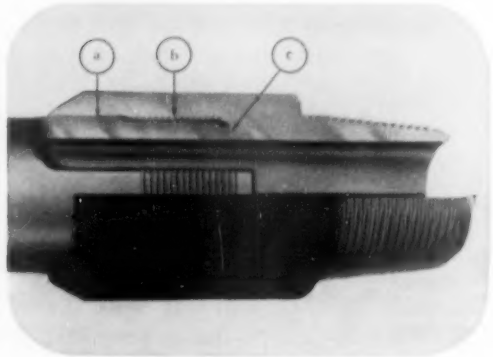


1. **Longer Tool Joint Life:** When pipe must be discarded, the tool joint can often be saved. Field replaceable joints are removed from old pipe, applied to new . . . *right at the rig!*

2. **Saves Time and Money:** No need to shop pipe to change joints. After long service (or accidental damage) tool joints can be replaced . . . in minutes . . . *right at the rig!*



4. **Foolproof:** Reed's crew or your own men simply screw the heated joint onto the drill pipe until the landing shoulder strikes the end of the pipe with a "jar." The landing shoulder is a positive gauge to determine proper application of the tool joint.



5. **Here's the Payoff:** As the tool joint cools, the shrink-grip area (a) and the landing shoulder (c) form perfect seals . . . since the correct amount of shrinkage has been built-in at the factory . . . to protect the threads (b) against leaks and corrosion.

Naturally,

we're talking about the . . .

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Super
Shrink-Grip

REED ROLLER BIT COMPANY • HOUSTON 1, TEXAS . . . Gulf Coast, Mid-Continent, Rocky Mountain and

rig !

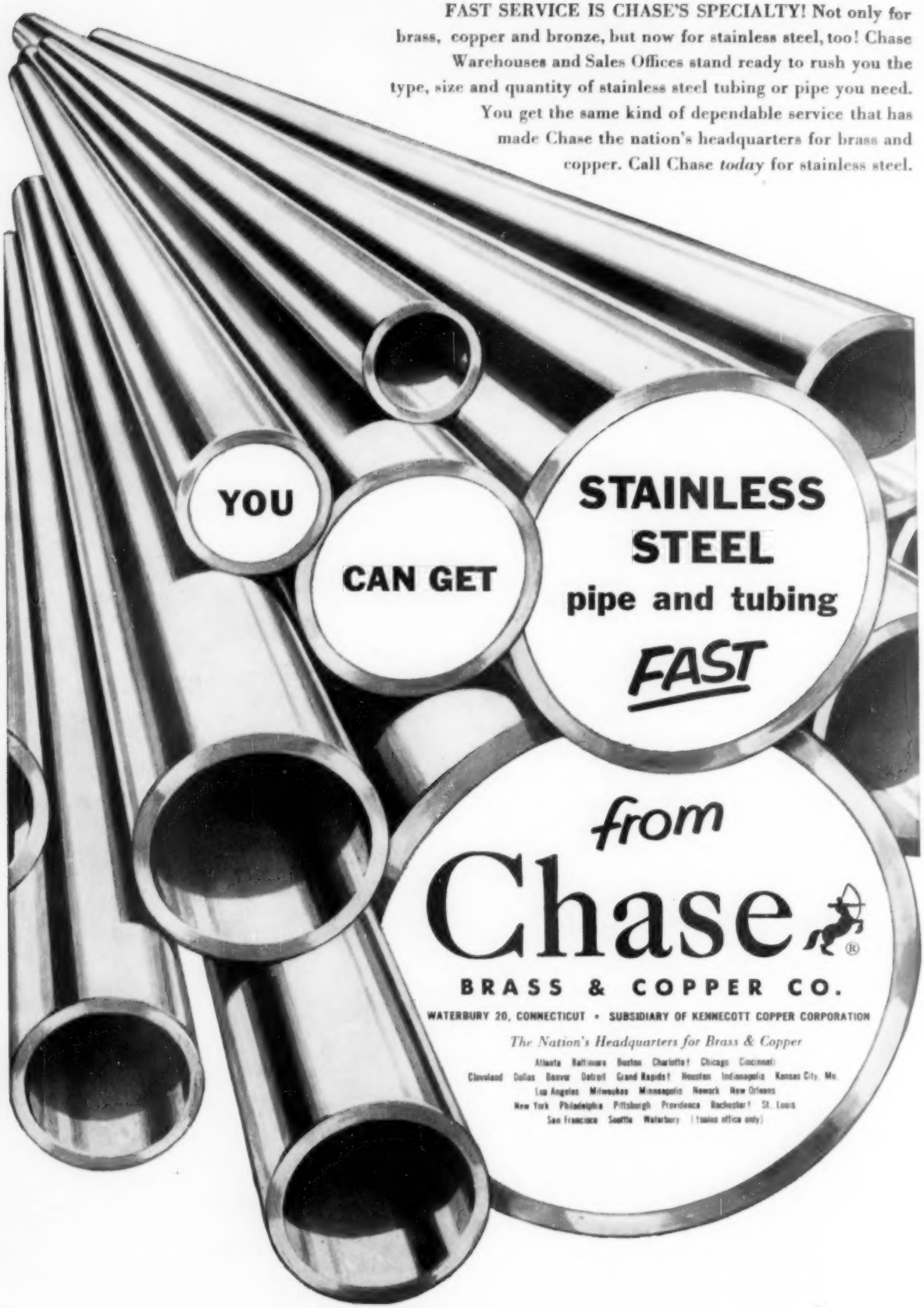
regardless of its location

3. **Just Call:** Reed will send a crew and portable heaters to do the complete job, or, the necessary equipment and a man to instruct your crew in its use . . . it's that simple.

6. **Practical and Trouble-free:** With both interior and exterior access to the threads fully sealed and the land preventing creeping, the threads are protected against galling, leaks and corrosion—thus making it practical to replace the joint in the field.

TOOL JOINT!

Canadian Distributor for Martin-Decker Products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JOB IMPROVEMENT FOR THE PROCESS FOREMAN—51

The A, B, C's of Instrumentation—4

TECHNIQUES of temperature measurement have improved considerably since the days when we used to spit on a hot line and watch to see whether it bubbled, fried, or danced in order to tell how hot it was.

Glass-stem mercury or organic-liquid-filled thermometers (Fig. 24) came into general use but are now mostly confined to the laboratory or other locations where excess breakage and dirty scale can be controlled. Indicating thermometers for general use are now of the bimetallic spiral type with a pointer and dial scale (for example the Weston, Fig. 25). Another bimetallic device (Fig. 26) which is used for controlling temperature where simplicity rather than accuracy is preferred is the rod inside a tube made of metals with different coefficients of expansion.

Fig. 24.

Fig. 25.

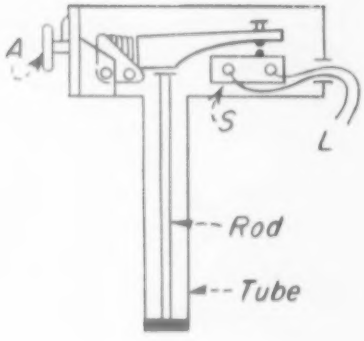

Fig. 26.

Thermocouples . . . The thermocouple is used extensively in measuring temperature.

A basic thermocouple can be made by twisting together the ends of two pieces of wire made from different metals—for example a piece of iron wire and a piece of copper wire as shown in Fig. 27.

If the temperature difference is maintained between the junctions as shown in Fig. 27, a small but measurable electric current will flow through the circuit. The voltage generated is in the range of 0 to 0.060 volts. This is equivalent to 0 to 60 mv. The magnitude of the voltage (or electromotive force) generated depends upon the temperature difference existing between the two junctions. It is roughly proportional to the amount of temperature difference. For example, if a temperature difference of 100° F. resulted in a voltage of 10 mv., then a 200° F. difference would result in a voltage of about 20 mv.

The material on thermocouples is courtesy of the refining department, Phillips Petroleum Co., Bartlesville, Okla.

In Fig. 27, iron and copper wires are shown twisted together. In practice, different combinations of metals are used. The relationship between the temperature difference existing between the junctions and the generated voltage is different for each set of metals used. This is illustrated in Fig. 28, using platinum as zero.

From Fig. 28 it can be seen that the copper-iron combination shown in Fig. 27 would result in very small voltage difference and would not be suitable for temperature measurement. An iron-constantan (I.C.) couple would give a usable difference as would a chromel-alumel couple (M.A.). These two combinations are commonly used in refineries. I.C. is used for temperatures up to 1,000° F., and M.A. is used above 1,000° F.

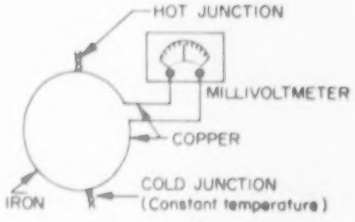

Fig. 27.

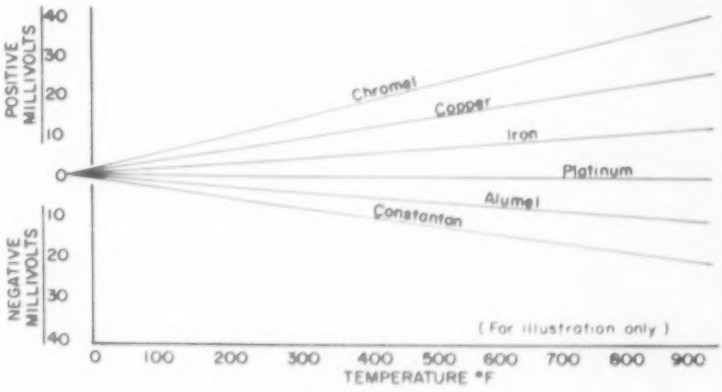

Fig. 28.

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TODAY'S MOST MODERN fueller, whose design was originated by The British Petroleum Company, is here seen servicing a B.E.A. Viscount.

The BP Aviation Service is a familiar friend of many of the world's most famous airlines. Its green and yellow fuellers are seen on runways all over the globe.

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by W. L. Nelson
Technical Editor

What Is an Economical Vacuum to Use

We note your table of steam quantities needed for steam distillation on page 235 of Petroleum Refinery Engineering, but how much steam is needed to produce the vacuum? What is an economical vacuum to use?—Wm. P.F.

You seldom encounter economic balances for vacuum systems because there are so many variables that generalities are impossible or misleading. Several of the variables act very rapidly in one range or another and hence each situation becomes a special problem.

The amount of noncondensable gases that must be handled is in itself a great difficulty. This was discussed on this page (April 5, 1951, page 100) and it can only be stated that the total gas ranges from 15 to 50 lb. per 1,000 bbl. of feed stock if the system is substantially free from leaks. This consists of air dissolved in the water used in generating steam, possibly air dissolved in the incoming feed stock, the tail of low-boiling material that cannot be eliminated by ordinary means from the feed stock, and worst of all, the gases that may be liberated by slight cracking or overheating of the feed stock in the pipe still. Finally, noncondensables are usually saturated with water vapor.

The next variable is the moisture that is associated with the noncondensable gases. In Fig. 1, it is evident that the water used in the barometric condenser to condense process steam is in contact with the noncondensable gases. Thus, the water exerts its own vapor pressure and tends to pervade the noncondensable gases. This constitutes a definite limit to the performance of the equipment. As an illustration, note that the vapor pressure of water (see Table 1) is 30.8 mm. at 85° F., and that a pressure in the barometric condenser of 30.8 mm. will simply cause the water to boil and completely overload the ejectors. Even at 61.6 mm. (2 × 30.8) pressure, the ejector will have to handle as much water vapor as noncondensable gases. Thus, as the pressure is reduced below 61.6 mm. towards 30.8 mm. the amount of water vapor handled climbs from 50 per cent of the noncondensable gas, to an infinite amount of water vapor.

It is quite evident that the temperature of the cooling water must be low and that large amounts of water must be used so that it is not warmed more than a few degrees in the barometric condenser.

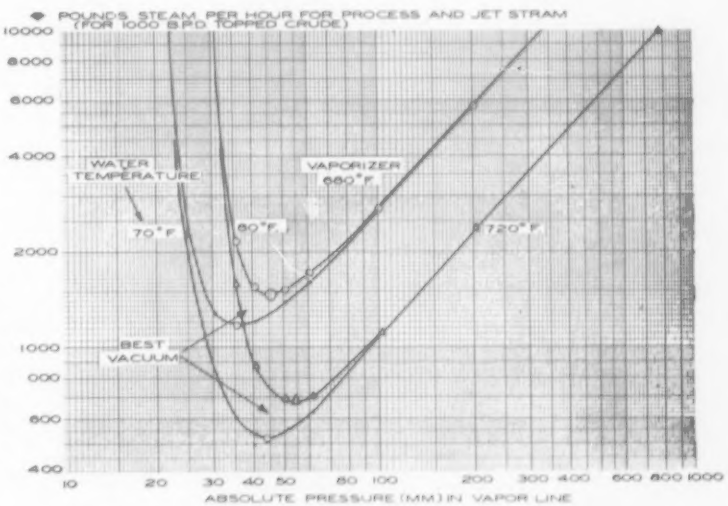


Fig. 3—Examples of most economical pressure for vacuum towers.

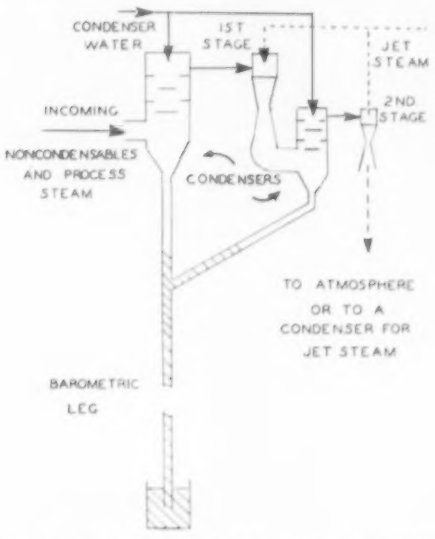


Fig. 1—Two stages of ejectors with a barometric condenser.

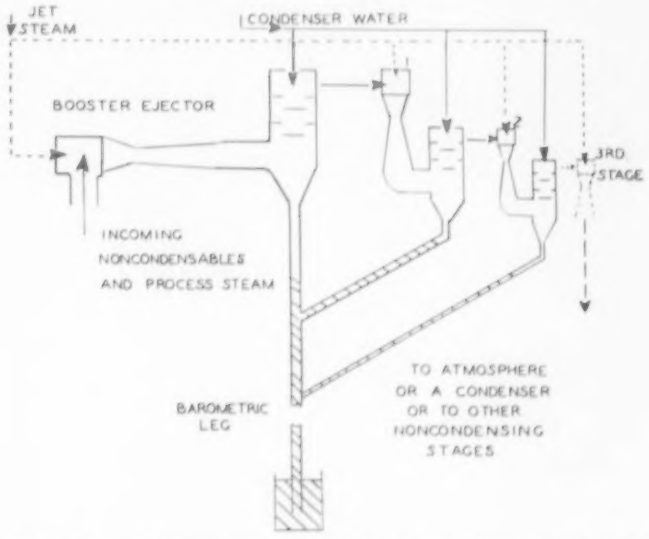


Fig. 2—Booster ejector, barometric and two or more ejector stages for low-pressure systems.

Example 1. If 30 lb. of noncondensables (considered here as air) are to be handled through a barometric condenser and its jets, and the outgoing water temperature is 85° F. (v.p. = 30.8 mm.), the total pounds of noncondensables and water vapor that must be handled by the jets at a pressure of 45 mm. is:

$$30 + \frac{30.8}{45 - 30.8} \times \frac{30}{28.8} \times 18$$

$$= 70.6 \text{ lb.}$$

in which 28.8 and 18 are the molecular weights of air and water. At 35 mm. pressure, the total pounds handled jumps to 167.50 and at 31 mm. to even 2,920 lb.

Steam for jets . . . Although manufacturers supply curves of the performance of their ejectors, the average performance cannot be stated with accuracy. However, the amount of steam required to operate the jets is somewhat as indicated in Table 2. The wide range is due mainly to differences in water temperatures, and in the amount of cooling water used.

In going to pressures much below 25 mm., three stages of ejectors are often economical and in most petroleum work it is also necessary to use a so-called booster ejector which compresses not only the noncondensables but also the entire process steam as indicated in Fig. 2. The booster ejector obviously requires a very large amount of steam and causes the total steam consumption to rise rapidly at low pressures.

TABLE 1
Vapor Pressures of Water

°F.	Pressure, mm.	°F.	Pressure, mm.
55	11	80	26.1
60	13	85	30.8
65	15.7	90	36
70	18.8	95	49
75	22.2	100	56.7

TABLE 2
Approximate Steam Consumption of Condensing Steam Jet Ejectors Operating with 100 Psig. Steam

Pressure, mm.—	Pounds steam per pound of total mixture*
Two-stage:	
200	4.3 (2.5-11)
100	6.0 (3.0-17)
70	7.0 (4.0-23)
50	8.2 (4.5-27)
40	9.0 (5.0-30)
30	10.2 (6.0-35)
Three-stage:	
20	12.3 (7.0-40)
10	16.8 (10-50)
7	20.0 (12-58)
5	23.0 (14-64)
4	25.5 (16-70)

*Noncondensables and water vapor.

TABLE 3—STEAM REQUIRED IN VACUUM DISTILLATION
(1,000 bbl. per day topped crude)

	Operating pressure, mm. Hg.*								
	760	200	100	60	50	40	35	30	25
Temp. at vaporizer, if no process steam is used	950	830	780	750	735	725	715	708	700
Process steam, lb. for:									
Vaporizer at 720° F.	9,800	2,220	867	325	190	54			
Vaporizer at 680° F.	22,600	5,610	2,560	1,340	1,037	732	580	427	274
Jet steam, lb. for:									
80° F. cooling water		150	232	378	492	830	1,600		
70° F. cooling water		146	222	312	368	480	600	857	2,010
Total steam required:									
680° F.—80° water	22,600	5,760	2,792	1,718	1,529	1,562	2,180		
680° F.—70° water	22,600	5,756	2,782	1,652	1,405	1,212		1,284	2,284
720° F.—80° water	9,800	2,370	1,099	703	682	884	1,600		
720° F.—70° water	9,800	2,366	1,089	637	558	534	600		

*Neglecting pressure drops between the vaporizer and the barometric condenser.

Example 2. If the system of Example 1 must operate at 25 mm. (the vapor pressure of water being 30.8 mm. at 85° F.) it will be necessary to install a booster ejector to raise the pressure of the noncondensables and any process steam from 25 mm. to some pressure above 30.8 mm. If the booster raises the pressure to 45 mm., the behavior of the remaining two-jet system will be the same as in Example 1.

The water consumption may be estimated with fair accuracy by means of a heat balance, but it must be borne in mind that some of the water may not be at the average outlet temperature and it is therefore customary to add 3°-5° F. to the computed outlet water temperature in computing the vapor pressure of the outgoing water.

Most economical pressure . . . Finally, in answer to the question, note Table 3 and Fig. 3. The pounds per hour of process steam required to maintain vaporizer temperatures of 700° and 680° F., when processing 1,000 bbl. per day of a conventional topped mixed-base oil are shown in Table 3. The effect of cooling water temperature is also indicated by using 70° and 80° F. cooling water.

Although the most economical amount of steam is indicated in Fig. 3, the towers used in operating at a low pressure are larger, and this is still another variable in this very complicated situation. However, the main economic considerations in estimating the most suitable vacuum are:

1. Vaporizer temperature in tower.
2. Temperature of cooling water.

Tailoring Gasoline Volatility

What are the proportions of blending components used in making a satisfactory distillation curve in a gasoline?—R.C.

The final gasoline blend must always be tested in the laboratory but in general, the several blending components are suited for adjusting various parts of the distillation, as:

Estimates of the proportions involves a trial-and-error computation in which the A.S.T.M. curve of each stock is converted into an approximate true-boiling-point curve. After blending according to percentage off at each temperature, the true boiling point of the blend is converted back to an A.S.T.M. distillation curve.

		A.S.T.M. distillation temperatures—			
	R.v.p. (vapor lock)	158° F. (ease of starting)	Acceleration— 212° F.	257° F.	356° F. (crankcase dilution)
Butane	x				
Pentane		x			
Natural gasoline	x	x			
Light straightrun gasoline		x	x		
Reformed gasolines*			x	x	
Cracked gasolines			x	x	
Heavy cracked naphtha				x	x

*Primary octane number improver.

How Today's Portable Gasoline Plants Operate—2

by Otha H. Grimes

STEAM is used in the ordinary manner for stripping in the still. This steam comes from the evaporator, which is heated by the hot lean-oil stream. This evaporator operates in a closed system. Since it is not fired, traces of hydrocarbons in the water fed to the unit are unimportant. The still has a conventional water-drawoff tray in the upper section. The water from this tray is returned directly to the evaporator.

This water return is operated without any control equipment simply by the separation of water from still reflux hydrocarbons at the water-drawoff tray and a seal arrangement in the drawoff line. The pressure at the evaporator is slightly higher than the pressure at the water tray, with the evaporator operating at still base pressure. Since the water tray is elevated, gravity returns the water to the evaporator nicely. The stackup in the drawoff line is in accordance with the pressure difference.

For simplicity, a common condenser is used for raw product and still reflux. The condenser-outlet materials pass to a separator tank from which the uncondensed hydrocarbons are released back to the reabsorber. The reflux pump receives a mixture of hydrocarbons and water from the bottom of this tank and discharges this mixture to another tank located below the separator.

This second tank operates at a pressure high enough above still pressure to deliver reflux to the top of the still and water to the process steam evaporator. This tank separates hydrocarbons from water, the water stream being controlled by a dual gravity liquid-level controller. The tank normally operates full of liquid. Still reflux passes from the top of the tank through a temperature-controlled valve back to the top of the still.

With this arrangement, the still reflux pump does double duty. It serves as a feed pump for the still process-steam evaporator as well as a still reflux pump. The water returned to the evaporator by gravity and the water handled by the still reflux pump combine to constitute the water used to produce process steam. A small amount of makeup water is occasionally added to compensate for water that leaves the system dissolved in the liquid-hydrocarbon streams.

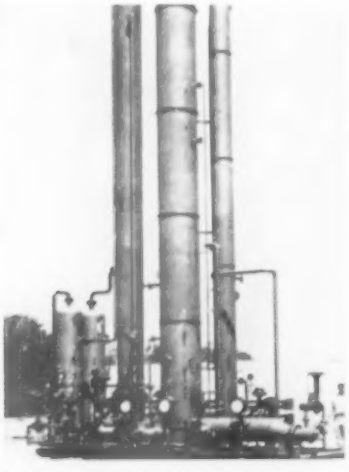
Stills . . . Stills for such plants are built with more space than usual below the bottom tray. This space serves as lean-oil storage. No liquid-level controller is used at the base of the still. Lean oil passes from the base of the still through the heat-supply system, as previously mentioned, to the oil heat exchangers and oil coolers.

A small pressure settling tank is usually installed between the lean-oil coolers and pump. Water is drained from this tank and released to a sump where, together with make-up water, it may be pumped to the process-steam evaporator. A single lean-oil pump is generally used, serving both the main absorber and reabsorber.

Rich oil from the high-pressure absorber is released to the reabsorber a few trays above the bottom. The reabsorber tower serves as flash tank as well as absorption tower. Uncondensed vapors from the still pass to the base of the reabsorber. This arrangement results in a substantial reduction in the methane and ethane present in the raw make.

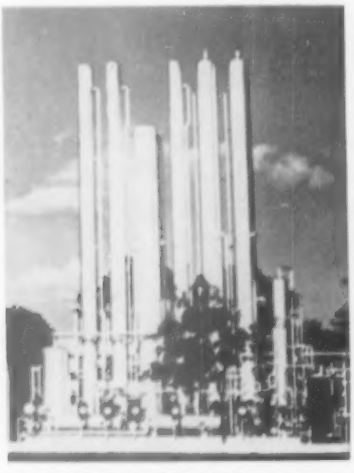
It is necessary to pump rich oil through the exchangers and furnace to the still since the reabsorber operates at a pressure slightly below still pressure. A back-pressure regulator on the reabsorber regulates the distillation-unit pressure.

Author is in the natural-gasoline business in Tulsa. Paper presented at annual N.G.A.A. meeting, Fort Worth, April 13.



MIDGET gasoline plant in operation on the west coast of Peru.

PREFABRICATED plant constructed and in operation in Oklahoma.



THIS Oklahoma plant involves a conventional absorption-distillation cycle.

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Among the

Drilling Contractors

Deckard Drilling Co., Shreveport, is on a new contract job in northeastern Wayne County, eastern Mississippi. It is a 4,300-ft. Eutaw test for R. Merrill Harris, of Jackson, Miss. Location is at 1 Long Bell, in 27-11n-5w, in the Langsdale area.

Petersen Drilling Co., Shreveport, is teamed with Ashland Oil & Refining Co. in a new wildcat operation 3½ miles northeast of Woodville, in Wilkinson County, southwestern Mississippi. The test, 2 Wallace, in 18-2n-1w, will be taken to 8,500 ft. It is northwest of Petersen's first Wallace test which had good oil showings in an 8,200-ft. Wilcox sand but which failed to establish commercial production.

J. C. Chance Drilling Co., Houston, is drilling on a new Sun Oil Co. contract at Chacahoula, in Lafourche Parish, southeastern Louisiana. Its job is at 1 Drexler Unit, in 66-15s-15e, on the edge of production. **Delta Gulf Drilling Co.,** Tyler, Tex., also has a rig working for Sun in the area. Its operation, 1-C Dibert, Stark & Brown, a mile southeast of production, is drilling near 12,000 ft. Sun also has two company-rig operations in the area.

Buster Gardiner is contractor on a projected 13,500-ft. wildcat test F. A. Callery, Inc., of Houston, is starting 2 miles northeast of Bayou Couba field, southwest of New Orleans, in St. Charles Parish, Louisiana Gulf Coast. It is Callery's second test in the immediate area.

Loffland Brothers Co., Tulsa, has the contract on a 13-000-ft. test Tide Water Associated Oil Co. is starting a mile east of production in the North Bourg area, Lafourche Parish, Louisiana Gulf Coast. Location is at 1-A Delta Securities, in 44-17s-18e.

Rimrock Tidelands will drill Sinclair Oil & Gas Co.'s new deep wildcat test in Block 86, South Timbalier Area, Gulf of Mexico, off Lafourche Parish, Louisiana. Location is more than 25 miles from land in the Outer Continental Shelf. Drilling will be carried to 15,000 ft.

Casner & Benz, of Oildale, Calif., are drilling for Dunn Brothers Petroleum Corp. at a new wildcat operation southeast of the Lanare area, at Helm, in Fresno County, California. The test is listed as 1 Steines, in 30-17-19. Depth objective is about 7,200 ft.

Rowan Drilling Co., Houston, has scheduled another deep test for Tide Water Associated Oil Co. in the delta marshes of Plaquemines Parish, Coastal Louisiana. Location, less than a mile inland from the Gulf of Mexico shoreline, is about 10 miles west of Tide Water's large Venice field, and about 6 miles south of Bastian Bay field. It

D. W. Dixon (second from right), tool pusher, and some of his crew on a rig Calvert Drilling Co., of Olney, Ill., and Oklahoma City, is operating under contract in the active and expanding Short Junction field, southwest of Oklahoma City, in northwestern Cleveland County and southeastern Canadian County, Oklahoma. Crewmen, left to right, are: Herb Cook, derrickman; E. R. Southerd, floorman; Fred Harris, driller; and John Cunningham, floorman. Picture was on a well drilling for Zurline Oil Co.

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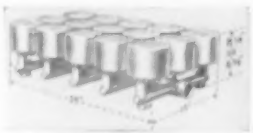

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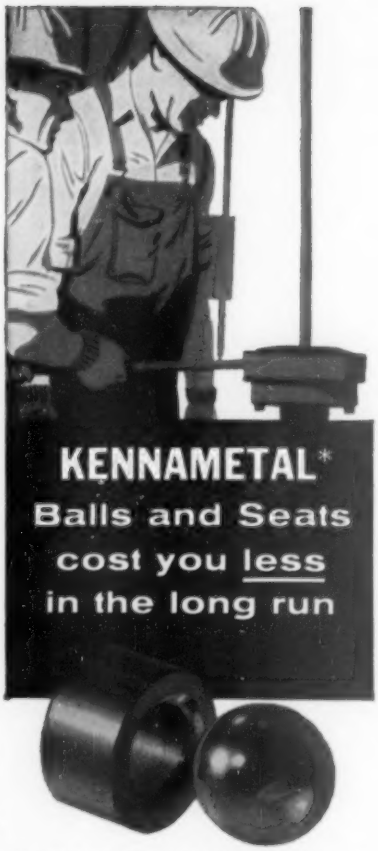

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INDUSTRY AND **KENNAMETAL**
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Longer pump life, less downtime, lower pump cost

is at 1 Abercrombie, in 4-22s-29e. It will be a 15,000-ft. test.

Dan L. Clark Drilling Co., Corpus Christi, is drilling for Northern Pump Co. at a new operation in Agua Dulce field, Nueces County, lower Texas Gulf Coast. Location is for 1 Ocker, in Partition Wright Lands, about 6 miles north of Banquete.

San Joaquin Drilling Co., Inc., Los Angeles, has a new deep operation getting under way at a wildcat location in the Greeley area, in Central Kern County, southern California. It is a contract job for F. M. Taylor, who plans to take the test to the Vedder sand about 12,000 ft. Location is south of production at Greeley. It is listed as 85-30 Union-Kopps, with location in 30-29-26.

Glenn Drilling Co., Tulsa, is starting another Pettet well for Sinclair Oil & Gas Co. in the Stonewell field, in DeSoto Parish, North Louisiana. It will be the third for the area. Location at 1 Stanley Unit, in 21-15s-14w, is a mile north of the discovery producer, and ¾ mile southeast of its confirmation well.

Milam Drilling Co., San Antonio, has a rig working for Holland Oil Co. at 1 Duncan, a 4,700-ft. wildcat test in Alexander Harrison Survey 2, about 4 miles southeast of Schattel, in northeastern Frio County, Southwest Texas. Location is about 3,000 ft. west of the Atascosa county line.

Carter-Jones Drilling Co., Kilgore, Tex., has a rig working for Bobby Manziel in the Vickie Lynn area, 4½ miles southwest of Jefferson, in Marion County, East Texas. Current operation is at 2-B Whelan, a 7,000-ft. test, in the M. W. Baker Survey.

Roberts Drilling Co., Shreveport, has taken a contract for an 8,100-ft Wilcox test in northwestern Beauregard Parish, southwestern Louisiana. Drilling is for Star Falcon Oil Co., whose location, at 1 Turner, in 25-3s-12w, is about 2 miles southeast of the new Merryville field, and about the same distance west of Neale field. It is north of the town of Merryville.

Abercalif Petroleum, Ltd., has taken a contract for a deep test to be drilled for C. W. Colgrove at a wildcat location a mile northeast of production in the Polvadero pool at the southeastern tip of Guijarral Hills field, near Coalinga, in Fresno County, California. The test, 18-30 Bordogaray, in 30-20-17, is projected to Gatchell sand, expected about 12,000 ft.

Iran Drilling Co. is drilling for F. R. Jackson at a wildcat location, 1 Hall, in the Hannah Payne Survey, 5 miles northwest of Hawkins, in Wood County, East Texas. Location is 2½ miles northwest of Hawkins field. Contract is for 5,700 ft.

Cook Drilling Co., Fort Worth, has the contract for another Smackover test Hunt Oil Co. is starting in the Red Rock field, in Webster Parish, northwestern Louisiana. It will be Hunt's 1 Haynes et al. Unit, in 18-23n-9w. Location is ½ mile southwest of the nearest well. Projected depth is 11,400 ft.

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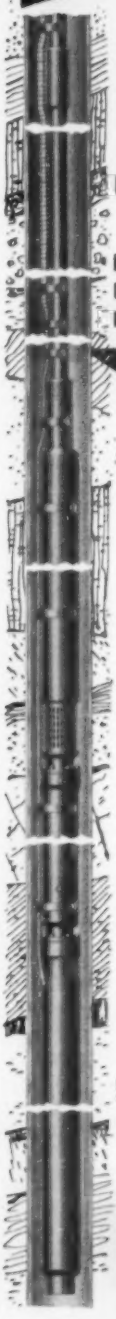

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Pipeline Patrol

. . . Report on Construction

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way. Uncontracted projects are indicated by • preceding the project.

Crude-Oil Pipelines

Buckeye Pipe Line Co.—Will complete in October or November 1956, own reconditioning of 191 miles of 8-in. from Griffity, Ind., to Lima, Ohio.

Lakehead Pipe Line Co., Inc.—Let 51 miles of 26-in. looping in Minnesota and North Dakota, to Anderson Brothers Corp. Job to be completed summer of 1956, is in conjunction with 69 miles of 24 and 26-in. looping to be completed this summer by Interprovincial Pipe Line Co. (See Interprovincial, foreign crude.)

• **Magnolia Pipe Line Co.**—Plans 14 miles of 16-in. from Ringgold to Addington, Tex., to be completed June 1, 1956. Plans a 22-mile, 8-in. gathering system, plus 3 and 4-in. laterals in Nolan County, Texas, to be completed May 15, 1956. Plans 36 miles of 12-in. from Andrews to Midland, Tex., to be completed January 1, 1957.

• **Offshore Gathering Corp., Houston.**—Proposes a natural-gas and a crude-oil line, each about 364 miles, to gather gas and crude in Gulf of Mexico off Louisiana. Gas line to be 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. Crude line to be mostly 20-in.

• **Pasotex Pipe Line Co.**—Plans 127 miles of 20-in. along its route from Wink to El Paso, retiring another dual 8-in. section.

• **Shannon Oil Co., Denver.**—Plans with Farmers Union Central Exchange, Inc., and Mule Creek Oil Co., both of Billings, Mont., a 34-mile, 6-in. line from Murphy Dome in Hot Springs County, Wyoming, to contact Ohio Oil Co.'s line in Big Horn County. Construction to start in August, end by December 1, 1956.

• **Sinclair Pipe Line Co.**—Building a 300-mile line from Jacksboro, Tex., to Houston. 152 miles of 18-in. from Jacksboro to Teague, Tex., completed. Remaining 150 miles of 20-in. not yet let.

• **Tecumseh Pipe Line System.**—190 miles of 20-in. will be built by Sinclair Refining Co., Pure Oil Co., Ashland Oil & Refining Co., between East Chicago and Cygnet, Ohio.

• **Union Oil Co. of California.**—Proposes 815-mile line from Rifle, Colo., to Los Angeles refining area, to carry products from its proposed Rifle shale-oil plant.

Products Pipelines

• **American Pipe Line Co.**—Received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line from Gulf Coast area to New York City area.

Buckeye Pipe Line Co.—Will complete in July 1956, conversion of 32 miles of 8-in. crude line between Mantau and Ellsworth, Ohio, to products line.

• **Cities Service Oil Co. & Subsidiaries.**—Plans a 10-mile, 6-in. L.P.G. line from Maysville to near Pauls Valley, Okla., to tie in to Shell line moving on to Cushing, Okla.

• **El Paso Natural Gas Co.**—Plans 240 miles of "larger than 6-in." to carry natural gasoline, butane, and propane, from its Midkiff natural-gasoline plant in Permian basin, Midland County, to El Paso. Has under way 96 miles of 8-in. in New Mexico, from its Blanco plant to its Wingate plant.

• **Gulf Refining Co.**—Will build 45 miles of 8-in. from Pontiac Eastern Corp.'s planned refinery at Hattiesburg, Miss. (due on stream May 1957) to a connection with Plantation Pipe Line Co.'s system. No date set to start.

Interstate Oil Pipe Line Co.—Let 25 miles of 8-in. from 12 miles south of Shreveport to Bethany, La., to C. Wayne Fowler, Pipe Line Contractor, Ins., to be completed June 1, 1956.

• **Magnolia Pipe Line Co.**—Plans a 75-mile, 8-in. L.P.G. line from Hull to Texas City, Tex., and a 30-mile, 8-in. line from Andrews to Dollarhide, Tex., both to be completed January 1, 1957. Plans an L.P.G. line, 19 miles of 6-in., 3 miles of 4-in., from Beaumont to Orange, Tex. Completion date indefinite.

• **Phillips Chemical Co.**—Plans 79 miles of 6-4-in. ethylene line from Sweeny to Pasadena, Tex., to be completed December 31, 1956.

• **Phillips Petroleum Co.**—Plans 15 miles of 6-in. L.P.G. line in Sweeny, Tex., area, to be completed September 15, 1956, and 16 miles of 3-in. product in Central Oklahoma area, to be completed June 1, 1956.

• **Phillips Pipe Line Co.**—Let 64 miles of 12-in. from Sweeny, Tex., to Houston, to be completed June 1, 1956, by H. H. Null. Plans 135 miles of 12-in. looping between Borger, Tex., and St. Louis, Mo., to be completed December 31, 1956.

Plantation Pipe Line Co.—Let 327 miles of 18-in. from Baton Rouge to Helena, Ala., to Oklahoma Pipe Line Constructors, to start June 1. N. L. Arie, spread superintendent, office at Baton Rouge. Completion set for December 1956.

• **Shell Oil Co., Pipe Line Department, Pacific Coast.**—Plans to convert 13 miles of existing 4-in. gasoline line, and add 3 miles of new line, to move gasoline from Wilmington refinery to Los Angeles. To be completed January 1, 1957.

• **Sioux Oil Co.**—Plans 80 miles of 4-in. from its Newcastle, Wyo., refinery to Rapid City, S. D., to be completed late 1956.

• **Southern Pacific Pipe Lines, Inc.**—Plans a line to span the Sierras and connect San Francisco with Reno and Fallon, Nev., and to serve the Sacramento Valley.

Sun Pipe Line Co.—Contracts let on 109 miles of 14-in. from Twin Oaks, Pa., to Newark, N. J.: Sheehan Pipe Line Construction, 90 miles from Twin Oaks to Plainfield, N. J.; Delaney-Missouri Valley Construction Co., remainder. Work to start May 1, end September 1956. The line, with 83,000-bbl. capacity, will replace present 8-in. line.

• **Sunflower Pipe Line System.**—Has Kansas Corporation Commission approval for 215 miles of 6-in. to move L.P.G. from six counties in western Kansas to Wichita.

Tennessee Gas Transmission Corp.—Contracts let for 200 miles, 6-in. L.P.G. line from Banquete, Tex., to Houston: Sheppard & Geiger Construction Co., section from Banquete to Port Lavaca; Oklahoma Pipe Line Constructors, 74 miles from there to Brazos River, Gene Gohring, spread superintendent,

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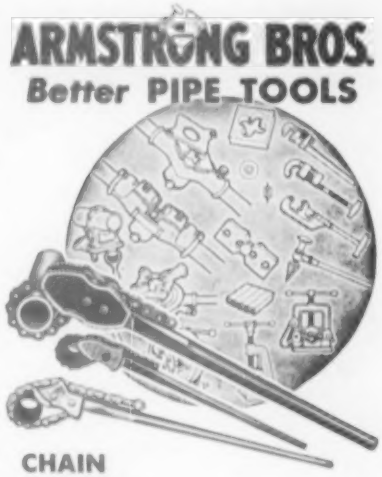

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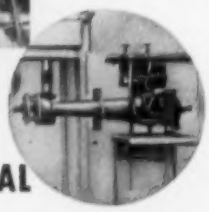

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Pipeline Patrol

office at Bay City; Panama-Williams Co., section into Houston.

Non-Petroleum Pipelines

• **American Gilsonite Co.**—Plans 70 miles of 6-in. from Bonanza, Utah, to Grand Junction, Colo., to carry slurry of gilsonite from mines to refinery now being built.

Pittsburgh Consolidated Coal Co.—Let to Williams Brothers, 108 miles of 10-in. from its mines in eastern Ohio to Cleveland Electric Illuminating Co.'s Eastlake power plant northeast of Cleveland. Work started April 1, 1956, on this first line to move coal, with Ford, Bacon & Davis, Inc., handling specifications, contracts, construction supervision.

Natural-Gas Pipelines

American Louisiana Pipe Line Co.—Let bulk of 1,160-mile line from North Tepetate, La., to Detroit. H. C. Price and Houston Contracting Co. have 770 miles of 30-in. from near Willow Run, Mich., to near Eudora, Ark.

Houston starts June 1 on 40 miles in Ohio, E. C. Norris, spread superintendent, office at Defiance; starts May 1 on 100 miles from east of Memphis, Tenn., working south towards Eudora, Ark., W. H. Hayes, spread superintendent, office at Collierville, Tenn.; starts May 15 on 85 miles working north from Eudora, F. A. Silar, spread superintendent, office at Eudora.

Price starts May 1 on 83 miles in Tennessee, R. L. Ezell, spread superintendent, office at Brownsville, Tenn.; 31 miles in Indiana, C. E. Shivel, spread superintendent, office at French Lick, Ind.; 83 miles in Kentucky, C. R. Ice, spread superintendent, office at Princeton, Ky.; 31 miles in Indiana, W. H. Olrich, spread superintendent, office at Edinburg, Ind.

Brown & Root has 221 miles of 30-in. from North Tepetate to Arkansas-Louisiana border (which is subcontracted to Sharon, Allen, Gay & Taylor, Inc.—formerly Associated Pipe Line Contractors—and Western Contractors), and 39 miles of 16-in. under-water line which it will lay itself. Western Contractors expects to complete its 100 miles August 1956. W. B. Williams, spread man, office at Eunice.

• **Arkansas Louisiana Gas Co.**—Has long-range plans for line from Texas-Louisiana coastal region to northern Louisiana, to connect with their present system.

Atlantic Seaboard Corp.—Williams-Austin Co. has under way 50 miles of 24-in. from Hardy County, South Virginia, to Greene County, Virginia. O. L. Martin, spread man, office at Elkton, Va.; and 37 miles of 26-in. loops along the Cobb-Rockville line in West Virginia. Ralph Gaddy, spread man, office at Elkins, W. Va.

• **Carolina Pipeline Co.**—Applied for South Carolina Public Service Commission permit to distribute gas in central South Carolina. Plans lines to 14 cities. Will buy gas from Transcontinental Gas Pipeline Co. or Southern Natural Gas Co.

• **Carolina Natural Gas Corp.**—Proposes 185 miles of 8-12-in. laterals off Transcontinental in North and South Carolina.

Cascade Natural Gas Co.—Engineering Construction Co. started April 1, 1956, laying 400 miles of ¾ to 12-in. distribution lines in Yakima, Grandview, Granger, Trosper, Sunnyside, Toppenish, Union Gas, Wahpato, and Zillah, Wash.

Cities Service Oil Co. & Subsidiaries.—M. L. Moore Construction Co. has 18 miles of 3 to 10-in. gathering system at Roberts Ranch near Odessa, Tex., to be completed June 15, 1956.

• **Coastal Transmission Corp.**—Applied to

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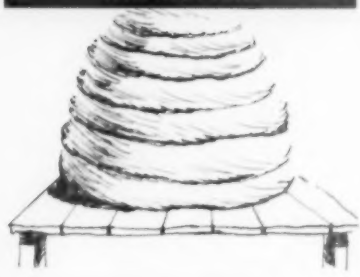

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FPC for 565 miles of 22-26-in. from McAllen, Tex., to Baton Rouge, to deliver to Houston Texas Gas & Oil Co.'s proposed line to Florida. Plans 272 miles of smaller gathering lines.

• **Colonial Natural Gas Corp.**—Proposes two systems: One between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.

• **Colorado Interstate Gas Co.**—R. H. Fulton has 238 miles of 22-in. from Laramie to Green River, Wyo. (last part of a 374-mile line between Denver and Rock Springs), to be completed fall 1956. Filed, March 29, for FPC permit for 1957 program: 307 miles of 30-in. from Idalia, Colo., to Beatrice, Neb., to take gas from a planned 165-mile, 26-in. line from near Carr, Colo., to Idalia, and from a 72-mile, 26-in. line from near Kit Carson, Colo. to Idalia; 215 miles of 20 and 24-in. to parallel present line from Texas Panhandle area to Kit Carson; 34 miles of 16-in. from Keyes field, Oklahoma, and Greenwood field, Kansas, to the new north-south line.

El Paso Natural Gas Co.—Has under way 193 miles of 34-in. between San Juan basin and Topock, Ariz., and 38 miles of 20-in. between San Juan mainline and Phoenix, both to be completed February 1, 1957. Western Pipeline, Inc. has under way 146 miles of 34-in. between San Juan basin and Topock, to be completed February 1, 1957, and 112 miles of 20-in. between San Juan mainline and Phoenix, to be completed November 1, 1956. El Paso also has under way 34 miles of 24-in. from Ignacio, Colo., to the Blanco plant, to be completed October 1, 1956; 34 miles of 20-in. from Sweetie Peck plant in Midland County, Texas, to Goldsmith plant in Ector County, Texas, to be completed May 15, 1956; 8 miles of 20-in. in Lea County, New Mexico, near Jal., to be completed May 25, 1956.

• **Empire Southern Gas Co.**—Plans a 10-mile, 8-in. line, and 5 miles of 4 in. gathering lines in Gray County, Texas, to be completed August 15, 1956. Plans a 4-mile, 8-in. loop south out of Pampa, Tex., on transmission line, and a 9-mile, 8-in. loop northwest out of Big Spring, Tex., on transmission line, to be completed September 1, 1956. Plans 6 miles of 4-in. near Big Spring, to be completed June 1, 1956.

• **Houston Texas Gas & Oil Co.**—Applied to FPC for 960 miles between Baton Rouge and Miami: 507 miles of 30-in., 157 miles of 26-in., 61 miles of 20-in., 224 miles of 18-in., 12 miles of 12-in. Plans 500 miles of sales laterals in Florida, with main line joining Coastal Transmission's proposed line from McAllen, Tex., to Baton Rouge.

• **Iron Ranges Natural Gas Co., St. Paul.**—Applied to FPC for a 68-mile transmission line and 47 miles of laterals to supply towns on the Mesabi Iron Range, Minnesota.

• **Kansas-Nebraska Natural Gas Co., Inc.**—Plans 11 miles of 12-in. from Colby to Oakley, Kans., to be completed August 1956. Plans 10 miles of 10-in. and 10 miles of 8-in. from Grand Island to Albion, Neb., to be completed November 1956. Plans 30 miles of 4-in. laterals to Eckley and Wray, Colo., to be completed July 1956.

• **Lone Star Gas Co.**—Has two plans before FPC to enlarge system in Texas and Oklahoma: one is a 230-mile line from Cotton County, Oklahoma, to Fritch, Tex.; one is a 205-mile line from Snyder, Tex., to a hookup with the Cotton-Fritch line. Plans are attempt to keep Natural Gas Pipeline Co. of America from building line from Wise County, Texas, to Fritch.

• **Michigan Consolidated Gas Co.**—Plans 62 miles of 12-10-in. from Muskegon to

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Pipeline Patrol

Ludington, Mich., and 67 miles of 12-10-in. from Lake George to Travers City, Mich., both to be completed July 15, 1956.

• **Michigan Wisconsin Pipe Line Co.**—Proposes 251 miles of 24, 18, 12, 6, and 4-in. loops in Wisconsin.

• **Midwestern Gas Transmission Co.**—Will build a main line from Portland, Tenn., to Canadian border near Emerson, Man.; 829 miles of 24-in., 109 miles of 16-in., 174 miles of 12-in. Plans 648 miles of 3 to 18-in. extensions in Minnesota and Wisconsin, pending FPC approval.

• **Natural Gas Pipeline Co. of America.**—Has FPC approval for 350 miles of 20 and 26-in. from Jack and Wise counties, Texas, to Fritch, Tex., which will be contested by Natural Gas Pipeline and Lone Star Gas Co. Filed for FPC permit for a 389-mile, 36-in. loop along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co. Also for 91 miles of 30-in. looping to be laid along parts of its main line. R. H. Fulton & Co. has under way 25 miles of 12-in. laterals and 18 miles of various size gathering lines in Gray and Roberts counties, Texas, to be completed Jly 14, 1956.

Nevada Natural Gas Co.—Plans loops along its 114-mile line from Needles, Calif., to Las Vegas, Nev.

New York State Natural Gas Corp.—Williams-Austin Co. has 17 miles of 30-in. from Caton to Horseheads, Steuben County, New York, to start July 9, 1956. Harford Brothers has 27 miles of 20-in. from Elk County to Clearfield County, Pennsylvania, to be completed June 15, 1956.

Niagara Mohawk Power Corp.—Let to various contractors, 275 miles of 2 to 12-in. distribution mains for growth of service areas in Central, Eastern, and Northern New York, to be completed December 31, 1956.

• **North Carolina Natural Gas Corp.**—This subsidiary of Colonial Natural Gas Corp. has permit from North Carolina Utilities Commission for 575 miles of 3 to 16-in. from Transcontinental Gas Pipe Line Corp.'s system near Mooresville, eastwardly across North Carolina.

• **Northern Natural Gas Co.**—Applied to FPC to add 348 miles of main line, 307 miles of branch lines in Wisconsin, Minnesota, South Dakota, and Iowa. Main lines include 169 miles in Duluth-Superior area, 164 miles in Aberdeen area of South Dakota. Proposes 73 miles of 20-in. from Savanna Creek to Pincher Creek fields in Alta., Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.

• **Pacific Gas & Electric Co.**—Will build 37 miles of 20-in., 37 miles of 18-in., 9 miles of 12-in. from Beehive Bend field near Willows, Calif., to near Davis, then to Sacramento. Has under way a 6-mile gathering system at Beehive Bend. Also plans to loop the Topock-Milpitas line with 135 miles of 34-in., laying major part in 1956, and 62 miles in 1957.

• **Pacific Northwest Pipeline Corp.**—Has FPC permit for 37 miles of 6-in. from Dove Creek, Colo., to Nucla, and 13 miles of 4-in. from Nucla to Uravan, to serve Union Carbide Nuclear Co. and Vanadium Corp. of America. Contracts let on other trunk and sales laterals:

A. P. V. Co., Inc., 81 miles 26-in. between Plymouth and Goldendale, Wash.

Engineers Limited, Inc., 56 miles 26-in. between Goldendale and Stevenson, Wash.

Midwestern Constructors, Inc., 79 miles of 26-in. from Skamania to Toledo, Wash., to be completed July 1, 1956. M. T. Wilhite, spread man, office at Camas, Wash.

River Construction Corp., 64 miles 26-in.

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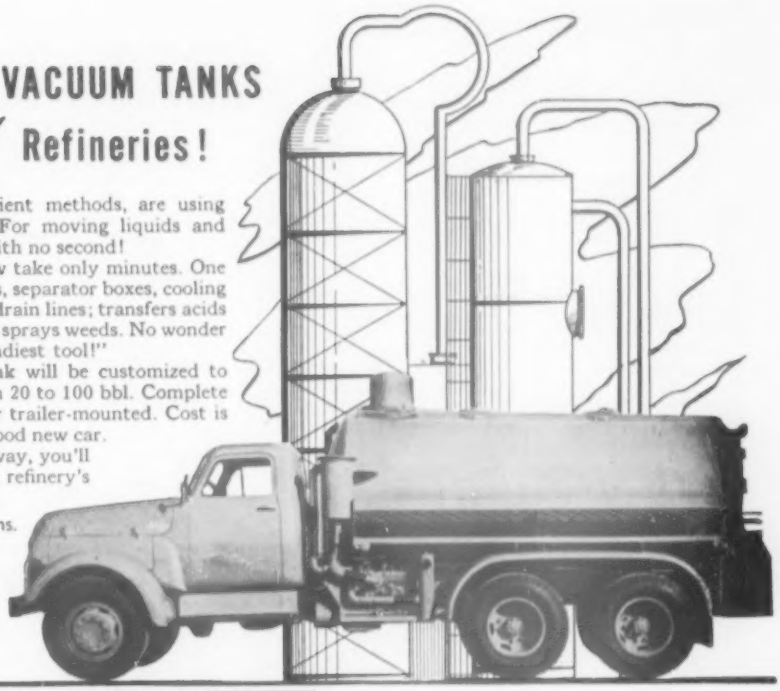

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Pipeline Patrol

between Toledo and Tacoma, to be completed August 1, 1956, Vernon Gayhart, spread man, office at Vancouver, Wash.; also 16 miles of 18-in. out of Portland, Ore., completed.

B & M Construction Co., 53 miles 26-in. between Tacoma and Duvall, Wash.

Curtis Construction Co., 87 miles 26-in. between Duvall and Sumas, Wash.

Hood Construction Co., 31 miles 6-in. near Walla Walla, Wash.

R. H. Fulton & Co., 156 miles 20 and 16-in. lateral from main line to Spokane; also 129 miles of laterals into Idaho.

Eastern Pipeline Contractors, 137 miles of 6, 8, 10-in. laterals from Plymouth to Wenatchee, Wash., to be completed July 1, 1956, L. Visentine, spread superintendent, office at Yakima.

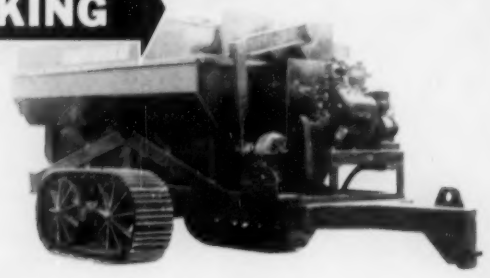
• **Permian Basin Pipeline Co.**—Has applied to FPC for 19 miles of 16-in. in Andrews County, Texas.

Phillips Petroleum Co.—Vaughn & Taylor has 135 miles of 20 to 2-in. gathering line in Central Oklahoma, to be completed June 1, 1956, and, with McVean & Barlow, 325 miles of 24 to 2-in. gathering line in West Texas, to be completed July 1, 1956.

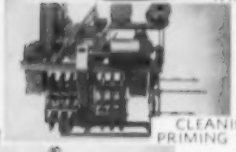
Portland Gas & Coke Co.—United Engineers & Constructors, Inc., of Philadelphia, has engineering contract for 80 miles of various size lines up to 16-in.

Signal Oil & Gas Co.—C. P. Bartley & Son has 70 miles of 2 to 16-in. gathering system near Tioga, N. D., to be completed September 1, 1956. C. P. Bartley, Jr., and Lawrence Barto, spread men, office at Tioga.

NO COKING



COATING AND WRAPPING MACHINES



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Agitator mat bars scrape entire kettle bottom every 3.35 seconds, allowing no material to remain on bottom long enough to burn, eliminating coking completely. Mat motion is slow enough so dope is not "whipped." Heavy mat will not float, scrapes bottom thoroughly.

OTHER FEATURES: Actual capacity is 25 bbl.-plus; Completely insulated; Melts dope fast; Drain valve inside kettle requires no pre-heating; Burner gravity-fed, no pump required; Fuel is diesel oil; Fuel tank capacity is 50 gals. Perrault-American 25 bbl. Kettles give contractors the most economical, rapid, maintenance-free-and-easy service. Other sizes available. For more information write or phone.

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• **Southern California Gas Co. and Southern Counties Gas Co. of California**—Plan three jobs: 19 miles of 30-in. from Placentia to Compton, Calif., to be completed November 1956; 70 miles of 30-in. from Palmdale to Alhambra, Calif., to be completed November 1956; 210 miles of 30-in. from Topock to Palmdale, to be completed April 1957.

• **Southern Natural Gas Co.**—Has temporary FPC authority for 39 miles of loops near Atlanta, Ga.

• **Tennessee Gas Transmission Co.**—Projects:

192 miles of 24-in., 34 miles of 20-in., 15 miles of 18-in., 110 miles of 4, 6, 8, 10, and 12-in. laterals to extend gathering system from west of Crowley, La., to tie in to Tennessee Gas gathering line, eastward across southeast Louisiana, to mouth of Mississippi River, with laterals extending into Gulf of Mexico.

Contracts let: Houston Contracting Co. has 162 miles in southern Louisiana; 25 miles of 24-in. completed; 25 miles of 24-in. marine line including the Atchafalayaz River crossing, to be completed May 15, spread superintendent, R. E. Thornton, office at Morgan City; 25 miles of 24-in. marine line southwest of Cocodrie, spread superintendent, H. E. Murphy, to be completed May 15; 60 miles of 8, 10, 12-in. laterals south of Morgan City, to be completed June 15, spread superintendent, M. L. Thompson.

Williams Brothers Co. has 55-mile, 24-in. marine job from Cocodrie, La., east of Bay Chalon area, spread man, W. A. Briley.

Grayco Constructors, Inc., Sharman, Allen, Gay & Taylor (formerly Associated Pipe Line Contractors, Inc.), and Collins Construction Co. have remainder.

Has FPC permit for 74 miles of 30-in. looping from Cave City to Danville, Ky., and for 147 miles of 26-in. looping from east of New Boston, Ohio, and north of Ohio River to McConnellsville, and from Newcomerstown to Lisbon, Ohio, both to be completed fall of 1956.

H. C. Price Co. has 82 miles of 26-in., G. A. Reutzel, spread superintendent, office at Chauncey, Ohio.

Applied for FPC permit for 63 miles of 30-in. looping from Scottsville, Ky., to Cave City, and from southwest of Danville to northeast of Danville; for 99 miles of 26-in. looping from Greenup, Ky., to north of Ohio River, from McConnellsville to Newcomerstown, and from Lisbon, Ohio, to near Mercer, Pa.; for 100 miles of 4, 6, 8, 10, and 12-in. gathering line in Texas-Louisiana Gulf Coast area.

Tennessee Natural Gas Lines, Inc.—Walters & Prater has 9 miles of 12-in. looping including Cumberland River Crossing, Tenn., to be completed July 1, 1956.

Texas Eastern Transmission Co.—Applied to FPC, December 1955, for 422-miles of 30-in. from McAllen to Beaumont, Tex., to move imported Mexican gas. Applied for 530 miles of 30-in. looping from Kosciusko, Miss., to Uniontown, Pa. Will lay 45 miles of 24-in. from Provident City, Tex., to connect in Matagorda County, Texas, to tie the Wilcox Trend Gathering System with the extension from Mexico.

• **Texas Gas Transmission Corp.**—Plans 110-mile, 20-in. from Assumption Parish to near Eunice, La. Will also lay 40 miles of various size pipe along main line from Louisiana to Illinois. Both to be completed December 1956. Plans 53 miles of 30-in. from Chicot, Ark., to Clarksdale, Miss., to be completed September 1, 1956. Plans reconditioning of 21 miles of 18-in. line near Wilmot, Ark., and Clarksdale, Miss., to be completed October 1, 1956. Williams Brothers Co. has 9 miles of 26-in. near Whitesville, Ky., to be completed May 31, 1956.

• **Trans Carolina Pipe Line Corp.**, Commercial Building, Raleigh, N. Car.—Seeks

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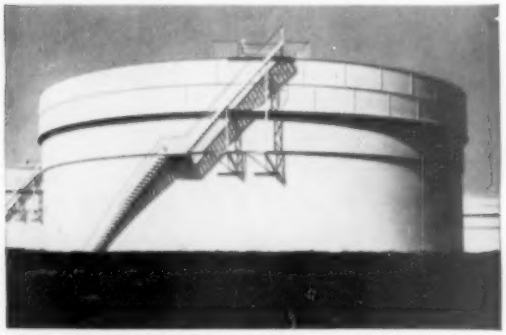

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Pipeline Patrol

FPC permit for 300-mile system across North and South Carolina, plus 500 miles of laterals.

• **Transcontinental Gas Pipe Line Corp.**—Has applied to FPC to lay 160 miles of 36-in. and 68 miles of 30-in. loops from Louisiana to Pennsylvania., to be completed December 1, 1956.

Foreign Crude-Oil Pipelines

Arabian American Oil Co.—Firm is building a 150-mile, 21-in. line from Safaniya field to near the Neutral Zone border.

• **Canadian Gulf Oil Co.**—Seeks approval for 35 miles of 8-in. to connect Drumhell field, Alberta, with existing Gulf lines running to Edmonton.

• **Cremona Pipe Lines, Ltd.**—Dutton-Williams Brothers, Ltd., has 60-mile, 8-in. line from Sundre-Westward Ho region to Calgary, to be completed July 1956. Company is subsidiary of Home Oil Co.

Creole Petroleum Corp.—Williams Brothers Sudamericano, Ltd., has under way 15 miles of 34-in. from Pueblo Viejo to Lagunillas, Venezuela, to be completed August 1, 1956.

• **Gulf Italia Co.**—Will complete late summer 1956, 35 miles from its Ragusa field in southwestern Siciliy to RASIOM's refinery at Augusta.

Interprovincial Pipe Line Co.—Let to Majestic Contractors, Ltd., 69 miles of looping along present system from Alberta to Sarnia, Ont., to be completed August 31, 1956: 67 miles of 24-in. between Carroll and Somerset, Man.; 2 miles of 26-in. between U. S. border and Gretna pumping station.

Peace River Oil Pipe Lines, Ltd.—Dutton-Williams Brothers, Ltd., has 35 miles of 8-4-in. gathering system at Sturgeon Lake, Alta., to be completed July 1956, Jack Engleking, spread man, office at Valleyview.

• **Pembina Pipe Line, Ltd.**—Sparling Davis Co., Ltd., has 100 miles of 3 to 10-in. gathering system in Pembina field.

PEMEX.—Constructora El Aguila, S. A., has 50 miles of 20-in. from Angostura to Veracruz, Antonio Sanz Polo, spread man, office at Veracruz.

• **Sinclair Oil Corp.**—Considering a 240-mile line from its Silvestre field in Barinas, Venezuela, to Puerto Cabello on Caribbean Sea.

• **South Saskatchewn Pipe Line Co.**—Plans 58 miles of 12-in. from Cantaur field to Dollard field in Saskatchewan, to start in July, end September 1956.

Westspur Pipe Line Co.—Majestic Contractors, Ltd., has 109 miles of 12-in. from Midale, Sask., to Interprovincial Pipe Line Co.'s pump station at Cromer, Man., and 50 miles of various size gathering lines in Midale-Frobisher area.

Yacimientos Petroliferos Fiscales (Argentina).—Has started 700 miles of 12-in. from Campo Duran to San Lorenzo. TECHINT, (Compania Tecnica Internacional), Buenos Aires, has 90 miles.

Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)—Williams Brothers Co. has 160 miles of 10-in. and 43 miles of 8-in. from Sicasica to Arica on the Chilean coast, to be completed December 1957.

Foreign Products Pipelines

• **Canadian Hydrocarbons, Ltd., Winnipeg**—Proposes 800-mile LPG line from Edmonton, Alta., to Winnipeg.

• **Estrada de Ferro Santos a Jundial Departamento Oleoducto.**—Plans 6 miles of 14-in. from the Capuava Refinery to Utinga Terminal, to be completed December 1956.

• **Imperial Oil, Ltd.**—Will lay 38 miles of 12-in. loop along present line from Waterdown, Ont., to Toronto.

• **Iraq Petroleum Co., Ltd.**—Plans 75 miles of 24-in., 180,000-bbl. daily capacity, from Homs, Syria, to Tripoli, Lebanon.

National Iranian Oil Co.—Contracts let on 573 miles of 10-in., 40,000-bbl. daily capacity, from Ahwaz to Teheran, Iran; Constain-John Brown, Ltd., London, and Williams Brothers Co., started February 1956, laying southern 337 miles; Enterpose of Paris, has northern 236 miles.

• **North Atlantic Treaty Organization (NATO).**—Laying 2,000 miles of lines to airfields in parts of Europe. Sharman, Allen, Gay & Taylor, Inc. (formerly Associated Pipeline Contractors, Inc.), has 450 miles from Iskenderun, Turkey, to Batman. TECHINT (Compagnia Tecnica Internazionale), Milano, Italy, has 205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir. Bids were taken in January 1956, on 300 miles of 12-in. between Marseille and Langres, France.

PEMEX.—Constructora El Aguila, S. A., has 155 miles of 12-in. from Tampico to Cd. Victoria, Geronimo Aviuchastegui, spread man, office at Tampico.

The United States Defense Department.—Sponsoring 485 miles of 8, 10, 12-in. from Cadiz to Zaragoza, Spain. Contracts let to Merritt Chapman & Scott; Benson & Montin of Oklahoma City; Agroman Construction Co. of Spain. Prime contractor is Brown-Raymond-Walsh.

Winnipeg & Central Gas Co.—Plans to get L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D., plant to move to planned, butane-propane system at Winnipeg.

Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)—Williams Brothers Co. has 190 miles of 4-in. from Camiri to Santa Cruz, to be completed December 1956.

Foreign Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co.**—Plans 547 miles of gathering system for the Trans-

A complete line of **low speed, medium speed, high speed, reversible,** and three series of **two speeds forward, reversible models** for every truck requirement.

FEATURING: strong, light-weight housings; forged, heat-treated gears; heat-treated shifter yokes; anti-friction bearings throughout, shaved gear teeth; double-lip shifter shaft seals, extremely low prices, nationwide distribution and service.

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TULSA, OKLAHOMA DIVISION OF VICKERS Inc.

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No QD (QUIET DESPERATION) as Sheaves arrive PDQ

There's no quiet desperation on your oil field job as Worthington Quick Detachable sheaves (and Worthington-Goodyear V-belts) arrive pretty darn quick.

That's spelling it out for you, but the point's a good one: You can count on quick delivery when you call on your Worthington distributor or oil field supply store for a QD. That's the original two-piece sheave, by the way—easy to get on, easy to get off, but always tight on the shaft.

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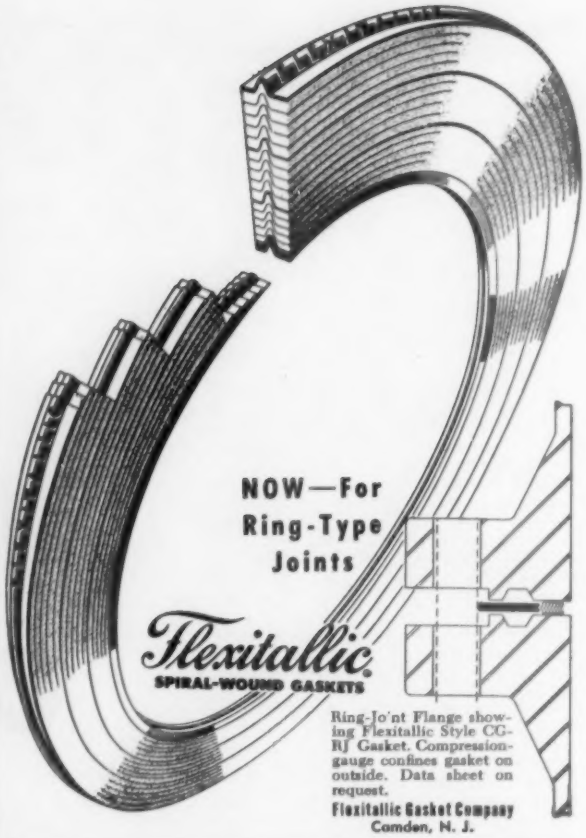

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Flexitallic Gasket Company
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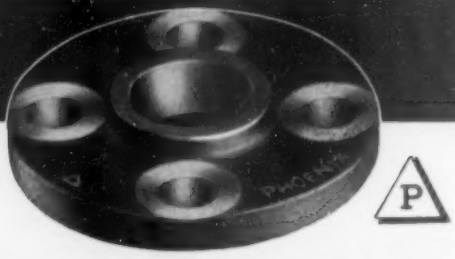

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PHOENIX MANUFACTURING CO.
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Pipeline Patrol

Canada line: 219 miles, to be completed in 1956, near Saskatchewan and including Pincher Junction, Provost, Bindloss, Sibbald, Oyen, Sunnynook, Steveville, and Cessford; 328 miles, to be completed in 1957, will include Countess, Duchess, Princess, Homglen-Rimbey, and Nevis.

Attock Oil Co.—Plans 60 miles from Dhulian field to Rawalpindi in West Pakistan.

Cia. Shell de Venezuela.—Plans 177 miles of 20-in. from La Paz field in the Maracaibo district, to the Cardon refinery on Paraguana Peninsula, to fuel refinery furnaces. To be completed in 1957.

• **Empresa Nacional del Petroleo.**—80 miles, 10-in., planned, Concon to Santiago, Chile.

• **Estrada de Ferro Santos a Jundial Departamento Oleoducto.**—Plans 16 miles of 6-in. from Cubatao refinery to Elcloro plant, to be completed December 1956.

• **Gas Industrial de Monterrey.**—Plans 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey in northern Mexico.

Imperial Oil, Ltd.—Has let 65 miles of 4 to 16-in. gathering system in Redwater area of Alta., to Majestic Contractors, Ltd.

• **Magna Pipeline Co.**—Plans to complete fall 1956, an underwater line from Anacortes or Bellingham, Wash., to Victoria.

Mid-Western Industrial Pipe Lines, Ltd.—Dutton-Williams Brothers, Ltd., has 33 miles of 10-in. from Alexander Indian Reservation to Lake Wabamun, to be completed June 1956, L. A. Stewart, spread man, office at Edson, Alta.

North Canadian Oils, Ltd.—Dutton-Williams Brothers, Ltd., has 136 miles of 10-in. from Lake Wabumun to Hinton, Alta., to be completed September 1956, L. A. Stewart, spread man, office at Edson, Alta. Crossings of the McCleod River, Pembina River, and Wolf Creek are being made early.

• **Saskatchewan Power Corp.**—Plans 224 miles in Saskatchewan, to be completed September 1, 1956: 120 miles of 12-in. from Success to Moose Jaw; 57 miles of 8 and 6-in. from Biggar to North Battleford; 30 miles of 6-in. from Dana to Humboldt; 17 miles of 10-in. from Coleville to Hoosier. Letting contracts began May 1.

South Alberta Pipe Line, Ltd.—Filed permit for 150 miles of 8-in. from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta.

Sui Gas Transmission Co.—Pakistan Constructors, a joint company of Morrison-Knudsen of Boise, Ida., and William Press, Ltd., of London, have 188 miles of 16-in. from Sui gas field to Moultan, Pakistan. Work begins mid-1956. Line to be extended later to Lahore with branches at Kot Addu, Jhang, Magiana, and Montgomery.

• **Technical Office of Hydrocarbon, Ministry of Mines and Petroleum, Government of Venezuela.**—Proposes a 321-km., 26-in. line from Anaco to La Mariposa near Caracas.

• **Trans-Canada Pipe Lines, Ltd.**—Time limit to complete financing a 2,250-mile line from Alberta to Toronto and Montreal, is extended to November 1, 1956. New deadline for exporting gas from Alberta is December 31, 1957. Ontario government will help finance line through its province. Tennessee Gas Transmission Co. has proposed a line to take the gas at Emerson, Man. (See Midwestern Gas Transmission Co).

Westcoast Transmission Co., Ltd.—Has let 650 miles of 30-in. from Peace River area, Canada, to Sumas, Wash. Dutton-Williams Brothers, Ltd., has 120 miles from Taylor, B. C., to Azouzetta Lake, to be completed August 1957, E. J. Roth, spread man, office at Dawson Creek, B. C. Mannix, Ltd., Canadian Bechtel, Ltd., and R. A. Conyes Construction Co. have remainder, to be completed September 1957.

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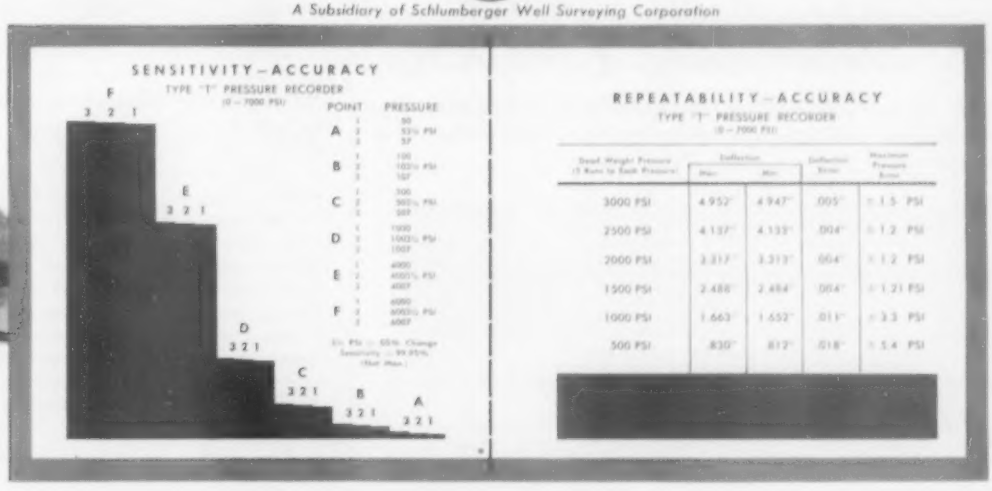

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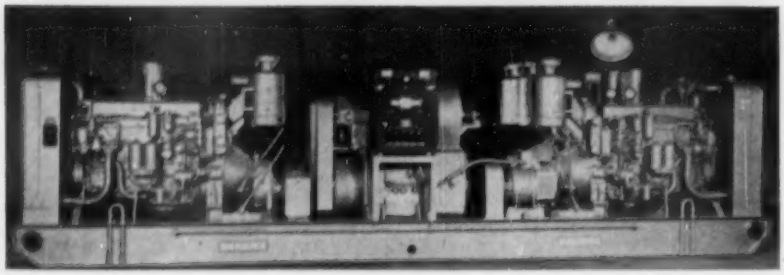
Showcase

OF NEW EQUIPMENT AND LITERATURE

by Dan B. Miller



RigElectric Offers Engine Choice

A new line of gas and diesel d.c. drilling-rig power drives is available with either the General Motors Detroit Diesel engine or the Climax natural-gas engine as the prime mover.

The standard basic power packages consist primarily of two models, the S12500 RigElectric d.c. unit and the Model S241000 RigElectric d.c. unit.

The Model S12500 unit consists of either two Model 6-110 General Motors Detroit Diesel engines rated 250 hp. each, or two Climax Model K-75 natural-gas engines arranged in a manner so that one power unit is directly connected to each end of a heavy-duty traction-type d.c. generator with a capacity of 600 hp. continuous. The engines are connected to the generator shaft extensions through a disconnect clutch and flexible connection on each engine.

The Model S241000 RigElectric d.c. unit consists basically of either four Model 6-110 General Motors Detroit Diesel engines rated 250 hp. each, or four Model K-75 Climax natural-gas engines with the four engines unitized and arranged on a common steel skid-type base and powering two heavy-duty traction-type d.c. generators with a capacity of 600 continuous hp. each.

The RigElectric makes use of a separate generator for each electric motor. This, along with the fact that the control system is simple, makes it possible for the usual drilling-rig personnel, without specific electrical training, to operate and maintain it. **For more information write or call: Stewart & Stevenson Services, Inc., P. O. Box 1637, Houston, Tex.**

Short-Pulse Blaster Gives High Seismic Accuracy

A new precision seismic blaster provides a high degree of accuracy in the inducement of application time breaks. The short-pulse blaster gives positive firing action within a highly restricted period of time. A high current is sustained for 0.3 milliseconds and then reduced sharply to zero within 0.2 milliseconds. Since the cap must fire during this period, the application time break inaccuracy is confined to 0.5 milliseconds.

The short-pulse blaster consists of two separate units housed in the same case, the pulser unit and the time-break unit.

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The Harvey plant contains the most modern in pipe handling, cleaning, coating and inspection equipment. It is under the supervision of an engineer with long experience in corrosion control. Its staff is composed of skilled workers who are thoroughly trained in PLASTICAP techniques. Combined with the superior qualities of PLASTICAP coatings, it offers **the very finest** in tubular goods protection.

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ance, the short-pulse blaster operates efficiently from +150° F. to —40° F. Below the freezing point, mercury batteries are recommended. The short-pulse blaster is portable, weighing 12¾ lb. **For more information write or call: Houston Technical Laboratories, 2424 Branard, Houston 6, Tex.**

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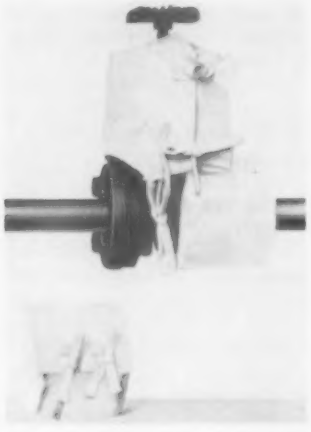


Valve Covers Protect Personnel and Equipment

A line of universal Spray-Stop valve covers made in only 11 sizes, replaces the previous line of 142 different sizes required for valves. These valve covers, designed to prevent sudden leaks from jetting onto personnel and equipment, are made in three types.

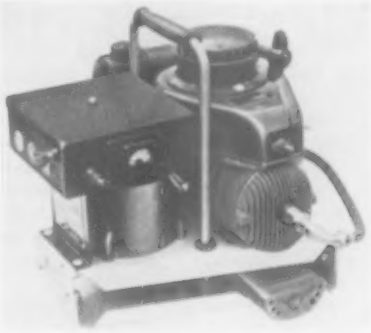
Nonindicating covers are used in applications where immediate detection of a leak is not critical. Indicating covers give rapid warning of leaks by a vivid change in color. Teflon valve covers are made for high-temperature applications. **For more information write or call: Neirad Industries, Inc., 1 Post Road, Darien, Conn.**

●

Portable Generator Weighs Only 35 Lb.

This small, lightweight, auxiliary power unit, Model 5903, is a completely self-contained gasoline-engine-driven generator package. It supplies either 1,350 watts of d.c. power or 1,500 watts of 400-cycle a.c. power. It weighs less than 35 lb. and is contained in a 1.5-cu.ft. package. It can easily be hand carried.

Because of its portability, the unit is

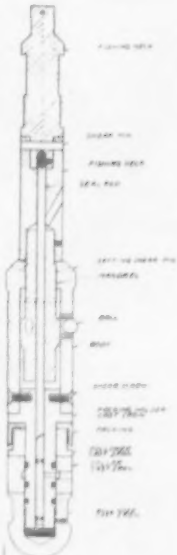


ideal for construction work and in general industry where standby or portable auxiliary electric power is required.

Fuel consumption is about 1 qt. per kw. hr. The engine, which is air-cooled, has an automatic rewind starter, and is equipped with a muffler. **For more information write or call: Lear, Inc., LearCal Division, 3171 South Bundy Drive, Santa Monica, Calif.**

●

Disintegrating Tubing Plug Made in Three Sizes



This disintegrating tubing plug is manufactured in three sizes for 2, 2½, and 3-in. tubing. The plug is run on a measuring line attached to a setting tool by a shear pin. When the plug seats in the landing nipple, the setting-tool shear pin and the setting shear pin in the plug are sheared, allowing the mandrel to force the balls out into the recess in the landing nipple, locking the plug in place. In pulling the plug the fishing tool catches the upper neck, and if the plug will not come loose, the shear pin is sheared and the neck and seal rod are pulled out. If pressure has not equalized, it will equalize through the plug.

A fishing tool is run to the second fishing neck, and if the plug will not come, the shear screws are sheared and the entire top of the plug is pulled, leaving the lower part of the plug, made of cast iron, to be broken up and driven down through the landing nipple.

The disintegrating plug saves pulling the tubing in case a plug cannot be pulled loose with a few strokes of the jars. **For more information write or call: Dale Co., 1237 West Fifteenth Street, Long Beach 13, Calif.**

●

New Keyseat Tool Designed For Greatest Cutting Area

The McClinton keyseat tool, designed for broaching through dog legs, keyseats, and other formation obstructions, is machined from a single solid bar of heat-treated chrome nickel steel.

Made to give greatest cutting area, the tool is 12 ft. long. Thus each stroke with the drill string obtains maximum effect when working through keyseats or other formation obstructions that might catch the drill collars when coming out of the hole.

Also, because a long keyseat tool broaches a hole of bigger diameter than the tool itself, it is not necessary to use oversize keyseat tools. By slacking off part of the pipe weight and rotating to the right, this tool has frequently worked down from an obstruction after being stuck.

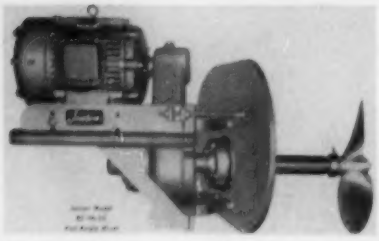
The new tool is recommended for continuous use in deviated holes to guard against keyseats and tight spots. **For more information write or call: McClinton Tool Co., 5302 Claremont, Houston, Tex.**

●

Vari-Angle Mixer Varies Direction of Stream

This newly developed Vari-Angle mixer was designed principally for use on crude-oil tanks to prevent deposits of sediment on tank bottoms. The Vari-Angle mixer produces a direct flow stream by varying the angle of the stream during operation.

The angle of adjustment is 15° to either side of the center line on the tank or a total of 30°. A ball-type stuffing box between the mixer-shaft housing and manway cover provides a seal whereby the angularity may be changed with the mixer running. Locking-type



adjustment screws on each side provide settings at any angle. The angle of adjustment is indicated on a scale.

Heavy pins are used to support the mixer from the cover. Mounting is usually made in the bottom portion of the cover to allow extra space for floating roofs.

Vari-Angle mixers are available in all standard mixer horsepower ratings and are mounted on 1-in.-thick covers to fit the various manway types and sizes. Installation is made by simply bolting the mixer and cover to the manway and by connecting power through a flexible conduit to permit the angular movement from side to side. No assembly or welding is required. **For more information write or call: Jensen Engineering Co., P. O. Box 3391, Tulsa, Okla.**

●

Air Mask Has Bell to Warn Of Depleted Oxygen Supply

A new air mask that weighs only 35 lb. and provides one-third more working time has been developed for use in the petroleum and chemical industries.

The air mask protects against a variety of gases, including carbon monoxide, hydrogen sulfide, aromatic hydrocarbons, carbon dioxide, chlorine, ammonia, hydrofluoric acid, and gasoline, benzine, and naphtha vapors.

Fyr-Fyter air masks are equipped with two cylinders, each holding 26 cu. ft. of air. They are easily mounted on the wearer's back. A bell warns the operator when the air or oxygen supply nears exhaustion so he can retreat to safety. Since none of the apparatus protrudes in front of the wearer, he has greater maneuverability in narrow spaces and can crawl and climb ladders.

The harness was designed so that the weight of the unit is equally distributed over the shoulder and hips, assuring greater comfort and a snug fit.

For more information write or call: Fyr-Fyter Co., 221 Crane Street, Dayton, Ohio.

●

X-Y Plotter Needs No External Reference Supply

A complete new series of X-Y plotters offer wider applications for the rapid graphic presentation of data. New features include a heavier one-piece main casting for added strength and accuracy and a new capillary pen containing an integral ink supply that provides easy flow and uniformity of line. The pen clamps on in a few seconds and spare pens may be easily inter-

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One "Microballoon"* treatment cuts evaporation loss

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Sohio Pipe Line Company has saved an estimated $50,000 worth of crude oil through the use of "Microballoon" spheres. For two full years evaporation has been cut 80 per cent! Yet the complete application paid for itself in a matter of months!

This gathering station of the Tri-State Area located at Mt. Vernon, Ind., includes working and multi-purpose tanks containing Kentucky crude and Illinois crude having a 4 to 6 RVP rating.

"Microballoon" spheres are non-abrading and won't harm tanks, pipes or pumping equipment. For more information, write Bakelite Company, or *Chicago Bridge & Iron Company*, Chicago 4, Illinois.

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INSIDE STORY! "Microballoon" spheres float 3/8" deep on surface, forming a perfect vapor-sealing layer for over two years.

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***saves* TIME**

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Extremely short overall length, extra weight, extra balance for fast, true falls.

Widespread duplex hook for easy elevator operation, locks in six positions.

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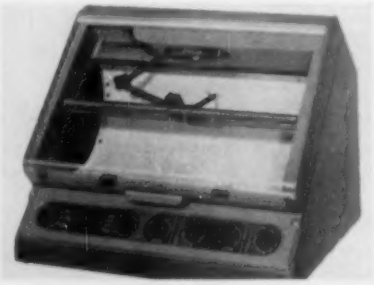
changed to allow color comparison of two different runs.

The new Model 200-A plotter responds to analog or digital inputs transduced by two potentiometers or comparable voltage-dividing devices located externally.

An external reference supply is not required. Analog functions may be plotted wherever a potentiometer can be employed for the input. Normally, a 10K potentiometer is used, and for this value the scale is expandable from 1/10:1 to 10:1 and the zero may be placed anywhere in the expanded area.

The Model 200-B plotter accepts d.c. voltages as its inputs and contains a regulated follow-up power supply. This



supply is referenced to an Eppley standard cell and is chopper stabilized to eliminate adjustment and provide drift-free operation. Model 200-B has zeroing knobs for placement of the origin anywhere on the chart surface. A rear connector provides access to the following for external control; servo motor disconnects, pen drop solenoid, amplifier outputs for servo null detection, B+, 6.3 VAC and complete cycle or clear switch on the pen solenoid. **For more information write or call: Librascope, Inc., Glendale 1, Calif.**

●

Torpedo Level Developed For Oil-Field Piping

An aluminum, torpedo level, No. 364, is equipped with a lifetime permanent magnet. It was developed at the special request of oil-field-material distributors for pipe installations.

The magnet securely holds the level on ferrous surfaces in any position indefinitely. Contact with metal surfaces does not weaken the magnet. This lightweight tool has three glasses: plumb, level, and 45°.

The new level leaves both hands free to work. Tapered design and high surface finish provide for easy handling and pocket insertion without snagging. **For more information write or call: Stanley Tools, New Britain, Conn.**

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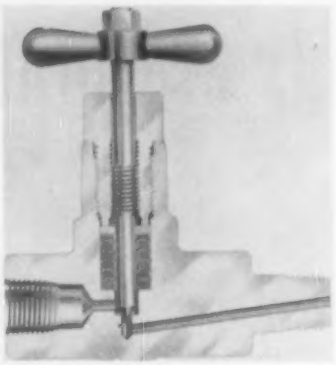

Needle Valve Designed for High-Pressure Processing

A 30,000-lb.-test pressure gage needle valve has been designed to handle the highest pressures that may be encountered in process work.

This new valve features a one-piece alloy-steel body, a welded bonnet for maximum safety, and a multicompound, noncrushable V-type packing. **For more information write or call: Oil Center Tool Co., P. O. Box 3091, Houston, Tex.**

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In Petreco Electrofining-Doctor Treating, the doctor solution is continuously dispersed into the gasoline stream treated. The volume of doctor solution, degree of dispersion and contacting time are precisely controlled by automatic instrumentation. The powerful Petreco electric field coalesces the dispersed phase of mixture resulting from the doctor solution injection and separates the spent doctor solution from the gasoline. "Blackstrap" is removed continuously, resulting in more efficient spent doctor regeneration.

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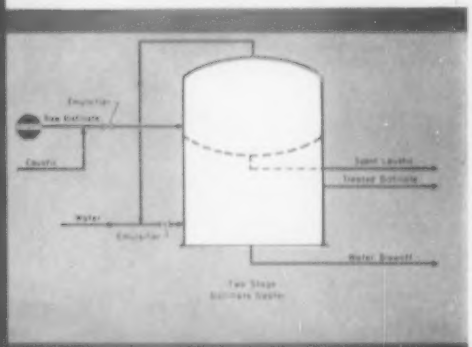
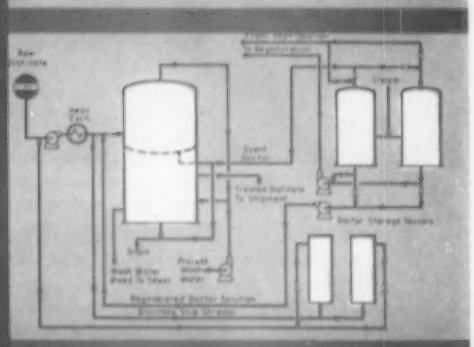
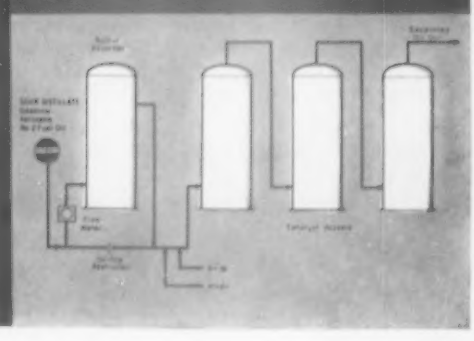
The Bender Process sweetens gasoline, kerosine, jet fuel and No. 2 fuel. It is especially effective in the kerosine-No. 2 fuel range. Sweetening is effected by converting mercaptans to disulphide by oxidation. There is no product loss in Bender Processing and chemical costs are around .5 cents per barrel. To attain treatment, sulphur is added to the distillate, plus a small amount of alkali, plus air. This mixture is passed over a bed of solid catalyst, yielding a sweet, bright, non-corrosive product.







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Ball Bearing Screw Jacks can't creep or drop— will hold loads indefinitely

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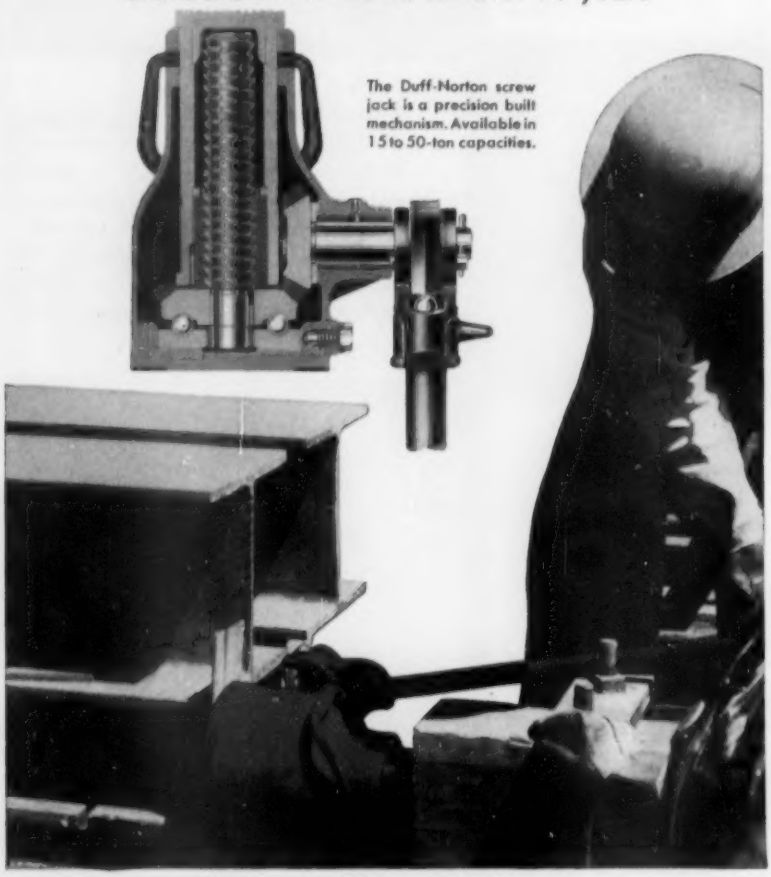

The Duff-Norton screw jack is a precision built mechanism. Available in 15 to 50-ton capacities.

Can be used upright or on side with equal efficiency—no fluids to leak, no air to "lock."

Duff-Norton Ball Bearing Screw Jacks, employing the basic inverted nut and screw principle, are locked in position when under tension, can't move up or down unless you insert the jack handle and apply hand power to ball bearing actuated gears in base that turn the nut. They are safe, foolproof, dependable, fully enclosed, rugged—*seldom need lubrication or servicing.*

For complete specifications on various capacities and name of your nearest recognized distributor, write the world's oldest and largest manufacturer of lifting jacks, the Duff-Norton Co., P. O. Box 1889, Pittsburgh 30, Pa. Ask for bulletin AD-12-B.

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Inductronic Instruments contains a series of technical articles compiled for easy reference. Performance, applications, and ranges of Model 1411 Inductronic d.c. amplifier are discussed in detail. This precision amplifier provides higher accuracy, stability, and response speeds than would be possible by direct instrument application. Accessories are: a reactive damping adaptor; an Inductronic fluxmeter, which allows the amplifier to be used as an integrator; a control unit; an Inductronic sensitizing amplifier; and a photocell range network. **For more information write or call: Weston Electrical Instrument Corp., Newark 5, N. J.**

●

Controllable Pitch Fan. Bulletin A-113 describes a new controllable-pitch heat-exchanger fan introduced in response to a need for a precise method of maintaining fluid outlet temperatures. Variable air delivery is accomplished by the variation in blade pitch setting. The fan assembly responds instantly and automatically, increasing blade pitch to deliver more air when the outlet temperature rises, decreasing blade pitch and delivering less air when the outlet temperature falls. Under some operation conditions, these fans consume up to 50 per cent less power than that required by conventional fixed-pitch fans. **For more information write or call: Hartzell Propeller Fan Co., Piqua, Ohio.**

●

Acidizing Service for Water Wells, a two-color, four-page folder, explains how water production declines due to buildup of deposits on equipment and stoppages in the water-bearing formation. Procedures for cleaning the deposits from the well equipment and treatment methods of the producing zone are featured. **For more information write or call: Dowell Incorporated, P. O. Box 536, Tulsa 1, Okla.**

●

Rocksil Insulation with Sheet Metal Finish, a 16-page booklet, discusses insulation made of natural minerals, melted at high temperatures, and extruded into silky filaments of low density.

Rocksil will not promote corrosion, is nonhygroscopic, rotproof, and does not attract vermin. Rocksil fibrous insulation is recommended for use on pressure vessels, storage tanks, ducting, pressure lines, and boilers. A table of recommended thicknesses and heat losses is given. **For more information write or call: William Kenyon & Sons, Ltd., Dukinfield, Cheshire, England.**

●

Production Control Use of X-Ray by Shell Oil. A new two-page bulletin tells how Shell Oil utilizes the X-ray spectrograph for production control at its Martinez refinery. The bulletin deals with additives and tetraethyl lead determinations. It describes how the new method provides required accuracy and is much faster and less costly than wet chemical methods. Charts and photos show the equipment setup and method used for obtaining answers to difficult problems. Construction details are given on a special cell developed by Shell for handling liquid specimens. **For more information write or call: Instruments Division, North American Philips Co., Inc., 750 South Fulton Avenue, Mount Vernon, N. Y.**

●

Fisher-Gulf Partitioner. Bulletin FS-255 describes a new instrument that is used in the high-resolution analysis of petroleum, solvents, liquid fuels, and is used in smog studies. This eight-page bulletin tells of a method called gas-liquid partition chromatography. **For more information write or call: Fisher Scientific Co., 381 Fisher Building, Pittsburgh 19, Pa.**

●

W-S Fittings, a new 12-page, pocket catalog contains basic information on forged-steel, screw-end, and socket-welding fittings; forged-stainless and alloy-steel fittings, 150-lb. stainless fittings; unions; and special fittings, as well as a line of hydraulic pumps and jacks. Size ranges, types, materials of construction, and design features are included. **For more information write or call: W-S Fittings Division, H. K. Porter Co., Inc., P. O. Box 95, Roselle, N. J.**

●

Here's Big Profit-Power News. Mechanical features of the complete line of new diesel crawler tractors are contained in a six-page, two-color folder, CR-553-F. Described are Models TD-24, TD-18, TD-14, TD-9, and TD-6, along with photographs of the machines on the job and closeups of outstanding features, such as the new Cerametallic clutch facings, improved operator visibility, push-button starting, 500-hour track-roller seals, pressurized

This hoist is the most efficient lightest, safest hoist in its capacity class available today!

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It's an exclusive Coffing-designed coil chain hoist using patented, compound hardened alloy steel levers instead of bulky, heavy gears. It's more efficient (85%), more compact, with the greatest power-to-weight ratio and the highest safety factor (5) of any ratchet lever hoist yet invented. Available in 6 models from ¾ to 5 ton capacities. Model RG coil chain hoist available in ¾ ton.

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COFFING HOISTS

cooling system, easier steering operation and extra-strength track frames. **For more information write or call: Consumer Relations Department, International Harvester Co., 180 North Michigan Avenue, Chicago 1, Ill.**

●

Filter Designed for Flow up to 2,000 G.p.m. A simplified filter for diesel fuel, lube, process liquids, gasoline, aviation fuels, and for use on pipelines is described in Catalog MK-170. The filter is designed for flow rates up to 2,000 g.p.m. in space as small as 2½ ft. in diameter by 4½ ft. high. Four different degrees of filtration are possible, 50, 25, 10, and 5 microns. Cartridge changes are made easily. The catalog gives specifications, flow rates, and engineering drawings. **For more information write or call: Cuno Engineering Corp., Meriden, Conn.**

●

Chemically Inert Mechanical Seals for handling all types acids, corrosives, solvents, and gases are described in a new eight-page, illustrated technical Bulletin S-205-2. The bulletin provides construction, service, and application information, including representative installations and engineering details. The mechanical seals described are the Types 9, 9B, and 9A. These seals incorporate sealing members fabricated from Du Pont Teflon to insure positive resistance to all chemical attack. They can be used over a wide range of temperature conditions from —120° F. to +500° F. and pressures to 750 psi. Type 9 seals are especially recommended for chemical, petrochemical, and refinery services. They are available in a full range of styles and sizes for all types of rotary shaft equipment, such as centrifugal and rotary pumps, mixers, agitators, and autoclaves. **For more information write or call: Crane Packing Co., 6400 Oakton Street, Morton Grove, Ill.**

●

Weather-Protected Motors for Outdoor Installations. Construction features of weather-protected motors are described in Bulletin 05B7874B. Mechanical features are portrayed by means of a cross-section diagram of a typical 700-hp., 2,300-volt, 1,185-r.p.m. squirrel-cage induction machine. **For more information write or call: Allis-Chalmers Manufacturing Co., 1059 South Seventieth Street, Milwaukee, Wis.**

●

Air-Cooled Heat Exchangers. A 24-page bulletin tells about the latest developments in air-cooled heat exchangers. Bulletin 2400 describes the design details, construction, distinctive features, and applications of the air-cooled unit known as the G-R fin-fan exchanger. Also included are specifications, sketches of available arrangements, and descriptions of mechanical equipment and control apparatus for various service requirements. **For more information write or call: Griscom-Russell Co., Massillon, Ohio.**

●

Two New Engines. In this folder, Form 31914, are described the 310-hp. D337 (Series F) engine and the 200-hp. D326 (Series F) engine. Both the D326 and the turbocharged D337 engines contain recent engineering and research developments. Many possible engine arrangements are available. **For more information write or call: Caterpillar Tractor Co., Peoria, Ill.**

●

Two Unit Bath for measuring existent gum content in gasoline is explained in Bulletin 756. The unit is designed for determinations, by the air-jet method, of existent gum content of aviation and motor gasoline as well as other aliphatic petroleum distillate products in the distillation range below that of kerosine. The bulletin discusses construction, uses, and accuracy of the equipment. **For more information write or call: Precision Scientific Co., 3737 West Cortland Street, Chicago 47, Ill.**

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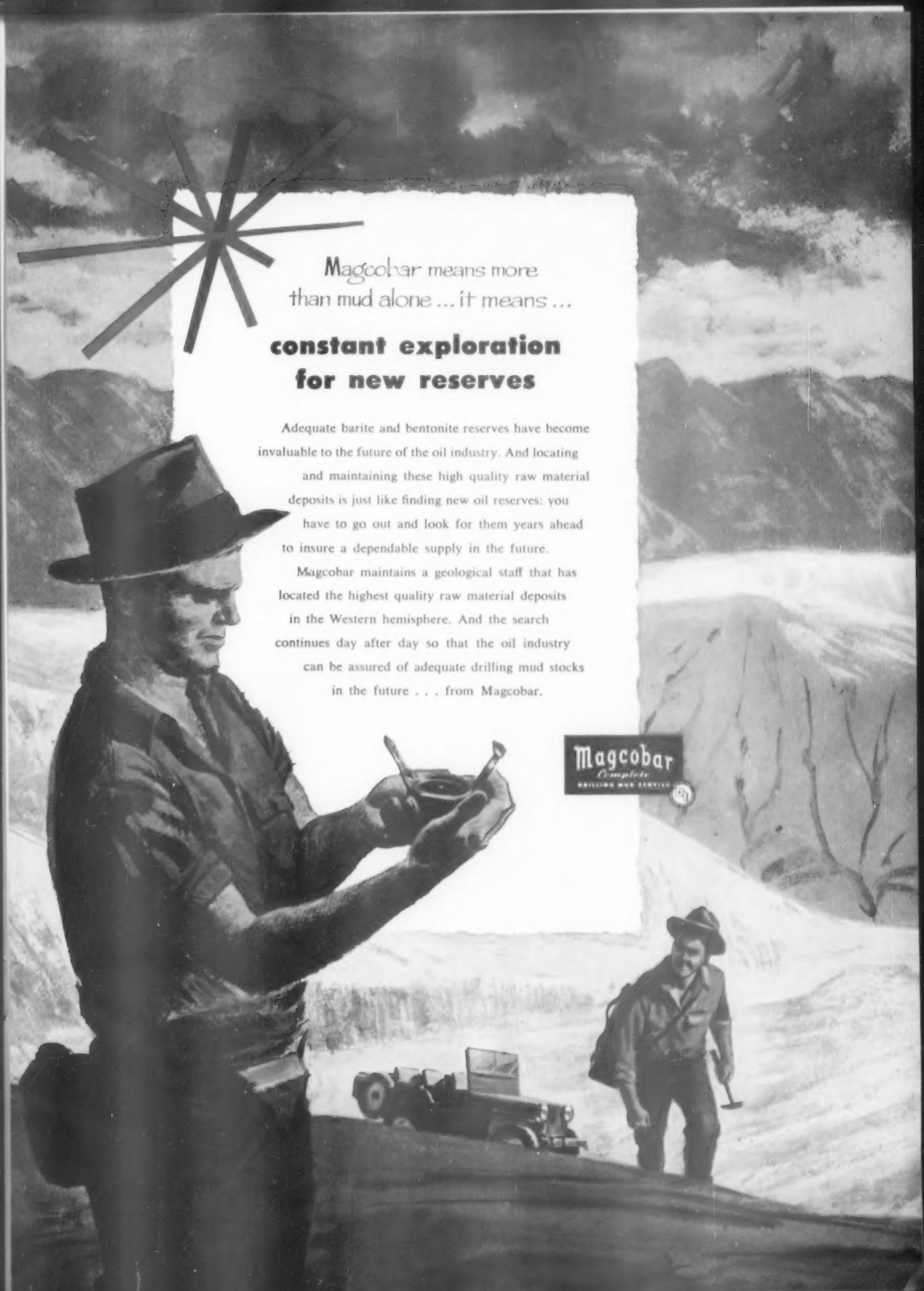
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EQUIPMENT MEN . . . in the News

Alco Exhibits New Engines At Annual A.S.M.E. Meet

Alco Products, Inc. featured an exhibit showing the versatility of its new 251 diesel engines at the annual meeting in New Orleans of the oil and gas-power division of the American Society of Mechanical Engineers.

The exhibit highlighted applications of the new engine, now available in the straight 6-cylinder and 12 and 16-cylinder Vee-type models.

In addition to displaying components of the new engine, photographs and paintings were incorporated to show actual applications of the new engine.

Carlson Joins National Supply as Sales Engineer

Lester E. Carlson, Jr. has joined the newly established industrial sales division of The National Supply Co. as sales engineer, it has been announced by W. T. Cushing, Jr., manager of industrial sales for the company.

Carlson was formerly general sales manager of the industrial products division of Westinghouse Air Brake Co.

W-K-M Consolidates and Opens New Facilities

J. S. Downs, president of W-K-M Manufacturing Co., Inc., Houston, a subsidiary of ACF Industries, Inc. has announced the reorganization of W-K-M and the consolidation of two companies, ACF Valve Division, Detroit, Mich., and Key Co., East St. Louis, Ill., into the new organization.

J. S. DOWNS

Downs also called attention to the completion of a new multimillion-dollar plant to house the three companies at Missouri City, Tex., a few miles south of Houston. The modern plant consists of 500,000 sq. ft. of working area. Each product group will have its individual production line. The new plant will be formally opened May 17 when guided tours will be conducted from 2 until 7 p.m.

The three consolidated companies manufacture products complimentary in many respects, and the unification was made to bring together the manufacturing and marketing operation in order to increase manufacturing efficiency, to gain economies, and to offer better, more complete service to customers.

W-K-M manufactures through-conduit gate valves used in production, pipeline, and refinery divisions. The company was organized in 1919 and in 1954 was purchased by ACF Industries.

ACF Valve Division was originally a department of American Car & Foundry and was made a division of ACF Industries in 1954. ACF valves are used principally in oil production.

Key Co. was founded in 1916 and is one of the country's oldest manufacturers of return bends and welding fittings for refineries and field-processing plants. The firm also makes a line of sealing compounds for general piping use. Key was purchased by ACF Industries in 1955.

Management and other key personnel from the two firms are being transferred to Houston. Machinery from the old W-K-M plant and the East St. Louis plant of Key Co., along with new equipment, has already been set in the new plant.

The new 12-acre multimillion-dollar plant to be occupied by the reorganized W-K-M Manufacturing Co. The plant is on a 75-acre site. All activities of the three firms that combined to make the new company are now concentrated in this new facility. Since offices, engineering area, and conference space requires only 48,000 sq. ft., the manufacturing plant alone covers close to 11 acres at one floor level.

Reynolds Heads New Grant Oil Tool Service Branch

Grant Oil Tool Co., Los Angeles, has announced opening of a new service branch in Oklahoma City with Herman Reynolds named as branch manager. Assistant branch manager is Les Hanson. The appointment of Carl O. Williams as Hobbs branch manager and Robert Melton as Odessa salesman has been announced by Robert E. Ringle, Grant sales manager.

H. REYNOLDS

WILLIAMS

Reynolds was employed by a drilling contractor for several years prior to his affiliation with Grant in 1951 as Hobbs branch manager. Hanson joined Western Geophysical Co. in 1947 and the Grant organization in 1952. Williams has spent much of his time in the oil fields with major drilling contractors in Texas and New Mexico. He first joined Grant in 1954. Melton, who has also had wide oil-field experience with major drilling contractors and oil-tool manufacturers before joining Grant, will contact operators throughout the West Texas area.

Lufkin Foundry Assigns Sales, Service Personnel

Lufkin Foundry & Machine Co. has announced the assignment of three new men to its sales and service personnel. Richard L. Rhodes has been assigned as service engineer for North Texas and southern Oklahoma; James T. Brown has been assigned to the Odessa, Tex., branch office; and Milton Kramer has been transferred from the home office to Lufkin's Houston office.

Rhodes has completed his factory training on installation and service of Lufkin pumping units and gas engines. His headquarters will be in the Wichita Falls, Tex., branch office. Brown has completed his training at the home office in Lufkin, Tex., and will be engaged in the sales of pumping units and gas engines in the West Texas-

New Mexico area. Kramer will be engaged in the sale of Lufkin commercial gears.

Gardner-Denver to Occupy New Office-Warehouse

W. A. NILSSON

A new office and warehouse building has recently been occupied by the Los Angeles branch of Gardner - Denver Co. The new location, in the central manufacturing district area, has been planned to serve the needs of Gardner-Denver customers in the construction, manufacturing, mining, and petroleum industries.

W. A. Nilsson is the Los Angeles district manager for Gardner-Denver Co. Additional personnel includes nine field engineers, two service specialists, a shipping clerk, a parts specialist, and four office employes including office manager.

The building consists of an office area of 2,400 sq. ft., a concrete and steel machinery warehouse with 5,600 sq. ft. of floor area, and an enlarged parts department of 1,100 sq. ft. The remainder of the 24,000-sq. ft. yard has been fenced to provide convenient space for storing and displaying the heavy - equipment items manufactured by the company.

O'Connor Tells Houston Nomads of Russian Experiences

One hundred and eighty members of Nomads and guests gathered recently in Houston to hear J. B. O'Conner, executive vice president of the Dresser Industries, relate his experiences in Russia and the Hydro-Drill acquired there. Foreign guests and dignitaries at the meeting were: G. H. Ratcliffe, drilling engineer, Shell Co. of Venezuela; W. B. Thomas, division manager, A-Z Export Co., S. A., Maracaibo, Venezuela; C. Hayden Dye, sales engineer, A-Z Export Co., S. A., Anaco, Venezuela; Willard Johnson, president, Magnet Cove Barium Corp., Houston; Thomas E. McDowell, president, Petroleum Overseas Consultants, Houston; J. B. O'Conner, executive vice president, Dresser Industries, Dallas; Preston Dillon, vice president, Overseas Consultants, Houston.

Reynolds Metals Sends Aluminum Pipe to Venezuela

Early in May the first export shipment of Reynolds aluminum oil-country pipe will leave Houston for Venezuela. The shipment, consisting of a carload of 2, 3, and 4-in. schedule No. 5 seamless aluminum pipe will be stocked by National Supply Co., which has warehouses at Anaco in eastern Venezuela and at Las Morochas in western Venezuela.

Biggest advantage gained by aluminum pipe's light weight is the saving of time and labor required for laying the pipeline. In temporary lines this advantage is multiplied each time the line is picked up and relaid.

Reynolds Metals and National Supply have signed a national distribution agreement and, more recently, an export distribution agreement. It is predicted that this marks the beginning of a new era in the oil fields, one in which aluminum will become commonplace for pipelines and many other applications.

These three men recently laid 2⅞-in. aluminum pipe at a rate of 1 mile in 1½ hours. Notice the quick-acting couplers welded to the pipe ahead of time. Ends of the pipe going to Venezuela are pregrooved for a different type of quick-acting coupler that does not have to be welded at all.

Schlumberger Names Ass't. To Mid-Continent Manager

E. E. FINKLEA

Ernest E. Finklea has joined Schlumberger Well Surveying Corp. as assistant to the Mid - Continent area manager with headquarters in Tulsa, W. J. Gillingham, executive vice president of Schlumberger, has announced. Prior to joining Schlumberger Finklea was employed by Geophysical Research Corp. as research engineer and later by Amerada Petroleum Corp. as log analyst. He has had considerable experience in the analysis of electrical logs. Finklea will assist Oklahoma oil operators with log interpretations.

Baldwin-Hill Appoints Mohun General Sales Mgr.

The appointment of J. L. Mohun as general sales manager, industrial insulation division, Baldwin-Hill Co., has been announced by Miles M. Wilson, vice president in charge of sales. Mohun will be located at the general sales office in Trenton, N. J.

Mohun was previously general manager, Southwest division, with headquarters in Temple, Tex. Before this he was with Union Asbestos & Rubber Co. as sales manager, industrial insulation division.

Vice President of Export Sales Named by Ideco

The promotion of Gordon G. Wilbur to vice president has been announced by George W. Walton, executive vice president of Ideco, one of the Dresser Industries. Wilbur, who has had various key positions in Ideco sales and technical-service departments since joining Ideco in 1939, will be in charge of export sales and have general administrative responsibilities.

Wilbur has assisted in establishing Ideco as a supplier of drilling equipment and supplies to the international oil industry and has made several trips abroad in recent years. Prior to his promotion to vice president, he was assistant to the executive vice president at the Dallas headquarters.

Motorola Promotes Jones To National Sales Manager

H. A. JONES

The promotion of Harold A. Jones to national sales manager of Motorola Communications & Electronics, Inc. has been announced by Daniel E. Noble, vice president. Jones formerly was executive assistant to the national sales manager, Eugene S. Goebel, who recently was named vice president for market relations.

Jones, in his new capacity, will be responsible for implementing sales policy as well as executing sales planning and sales promotion. The function includes sales training, advertising, and technical-information services.

Jones joined Motorola in 1946 as a television-receiver engineer. He subsequently served Motorola as a microwave-development engineer, two-way-systems engineer, engineering supervisor of advertising and publicity, manager of the technical information center, and in 1954 he became executive assistant to the national sales manager.

Lane-Wells Names Compton, O'Haver as Regional Mgrs.

Gene Compton and Mike O'Haver have taken charge of two regions set up under Ray Hancock, Mid-Continent division manager of field services for Lane-Wells Co. The eastern region, under Gene Compton, is located in Oklahoma City and consists of the Oklahoma, Kansas, and Illinois districts. The western region, under Mike O'Haver, located in Denver, consists of the Williston, Rocky Mountain, and Farmington districts.

Before assuming his present duties Compton was district manager in Oklahoma and, prior to that, district manager in Kansas. O'Haver was assistant division operating superintendent and 3 years previous was Rocky Mountain district manager. Both men have over 15 years of experience with Lane-Wells.

Kayem Manages American Mannex Houston Office

A new and enlarged southwestern headquarters, under the direction of Hans Kayem, has been opened in the Texas National Bank Building, Houston, by American Mannex Corp., general agents in the United States, Canada, and Mexico for Mannesmann A. G. and its associated companies. Mannesmann is Germany's largest integrated producer of steel and steel-tubular goods. The company will continue to maintain a suboffice in Dallas.

At the same time the company has announced expansion of its operation to include electric-weld line pipe from the mill of Mannesmann-Hoesch, in Duisburg, just placed in operation. Sizes from 8⅝ to 16-in. o.d. are produced by the resistance-weld method, and from 16 to 40-in. o.d. by the Unionmelt method.

The company has also announced that its present production facilities in Germany will shortly be supplemented by the new mill of Cia. Siderurgica Mannesmann, Belo Horizonte, Brazil, which will be in full production within a few weeks; and Mannesmann Tube Co., a new automatic mill in Sault Ste. Marie, Ontario, which will come into full production at the end of 1956.

Welex Names Foerster and Taylor to La., Tex. Posts

W. O. FOERSTER

W. O. Foerster has been appointed district manager in Lake Charles, La., and A. N. Taylor has been named sales engineer for the Pampa district office of Welex Jet Services, Inc.

Foerster, formerly a sales engineer for the Gulf Coast division of Welex, has been with the company 6 years. A veteran of 15 years in oil-service work, Foerster worked as a shopman, rigman, and shooter before entering sales and management.

Taylor, who has spent 6 years in oil-well-service work, has been with Welex 6 months. He was formerly a sales engineer and a logging-truck operator with other service companies.

Division Heads Named by Maintenance Engineering

B. I. THORNGREN

Bert I. Thorngren has been appointed vice president in charge of the chemical division of Maintenance Engineering Corp.; Wilton H. Leverett has been made vice president in charge of engineering; and Edward B. Haldeman has been promoted to vice president in charge of sales, according to C. E. Naylor, chairman of the board.

E. B. HALDEMAN

W. H. LEVERETT

Thorngren started in the chemical division of the company in 1934, after 4 years in general technical service with a major oil company.

Leverett has been with Maintenance Engineering since 1935, having started in the service department. Following this, he concentrated on sales for a year and then was made superintendent of shop operations. Recently, he has been in charge of the Mason Neilan and A. O. Smith product sales for Maintenance.

Haldeman became Maintenance Engineering's representative for Lukens Steel Co. products. For the past 20 years Haldeman has supervised design, engineering, and sales of plates and heads for high-pressure refinery vessels.

Pittsburgh Coke Appoints Caldwell as Salesman

John H. Caldwell has joined Pittsburgh Coke & Chemical Co. as a salesman in the protective-coatings division, according to John G. Brich, product sales manager for Pittsburgh Coke's industrial coatings.

Caldwell had formerly been with S. D. Day Co., Houston.

Thorpe Insulation Co. Is Johns-Manville Contractor

The industrial insulations division of Johns-Manville has named Thorpe Insulation Co. of Houston as its insulation contract unit in the Gulf Coast area. In its new capacity, Thorpe Insulation will handle contract installa-

tions of Johns-Manville insulating materials.

President and general manager of Thorpe Insulation Co. is W. R. Downs, who will head a staff of insulation engineers, estimators, and mechanics trained in Johns-Manville's methods of insulation applications. Modern shop and fabricating facilities as well as complete stocks of Johns-Manville industrial insulations will be maintained.

The new contract unit will be backed up by the engineering and sales staff of the Johns-Manville Houston regional office headed by C. B. Hann, regional manager, and R. A. Stapleton, area sales manager.

Cooper-Bessemer Elects Miller Ass't. Gen. Mgr.

E. L. MILLER

E. L. Miller has been elected assistant general manager of The Cooper-Bessemer Corp. by action of the board of directors. Acting upon the recommendation of President Lawrence F. Williams, Miller's new capacity places him directly under the president and general manager. Miller will be responsible for over-all operations of the company.

Miller joined the engineering department of Cooper-Bessemer in 1946 and was appointed assistant general manager in 1954.

Axelson Adds Drake and McKenzie to Sales Staff

The addition of J. A. Drake and J. B. McKenzie to the sales staff as factory representatives has been announced by K. S. Ramey, sales manager for the petroleum equipment department of Axelson Manufacturing Co., division of U. S. Industries, Inc.

Drake will headquarter at Russell, Kans., and will serve that territory in addition to the Hill City, Kans., area. McKenzie has been assigned to the Houston area.

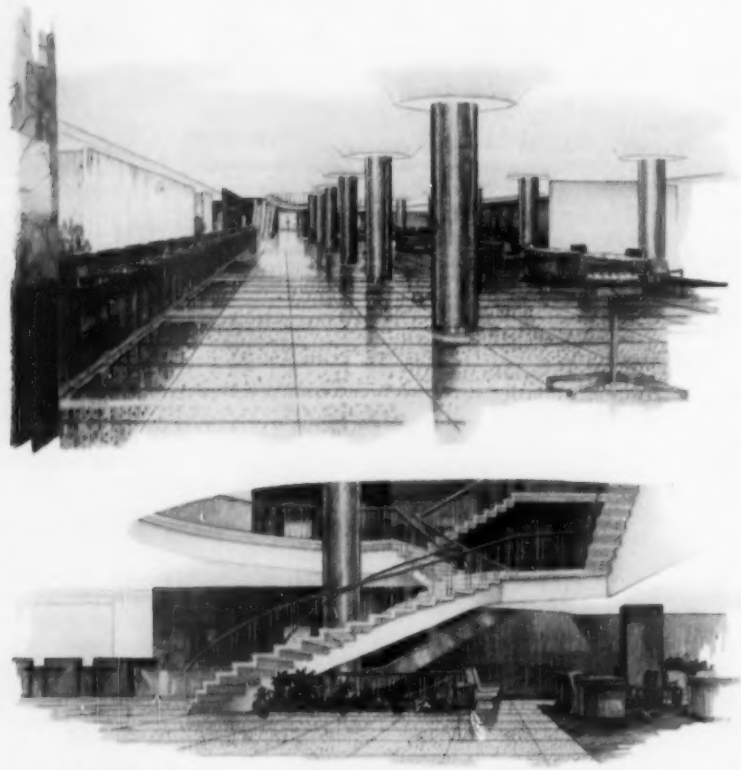
Fluor to Construct Three Engineering Buildings

Three precast, tilt-up concrete buildings to house an additional 180 engineers and draftsmen will highlight a $500,000 building program scheduled to get under way at the main offices of The Fluor Corp., Ltd. in Los Angeles.

Fluor previously had announced plans for the addition of a new $300,000 engineering and office building at the firm's Mid-Continent division headquarters in Houston. Completion of the Houston building is scheduled next September.

Each of the three concrete engineering buildings to be built here will contain 4,800 sq. ft. and will accommodate 50 draftsmen, and 10 engineers. Work on these units is expected to be completed about December 1.

Model of new $500,000 expansion of Fluor Corp., Ltd. plant in Los Angeles is studied by company executives, Melvin A. Ellsworth, vice president, engineering and construction division; J. Simon Fluor, president; and J. Robert Fluor, executive vice president.



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Reed Roller Bit Names London Representative

T. C. LEMCKE

T. C. Lemcke has been named technical representative of Reed Roller Bit Co. in London according to W. L. Childs, sales manager. Lemcke is now making a 4-months trip to oil operations in the Near East and Middle East for the Houston oil - tool - manufacturing concern.

Lemcke has been with Reed since 1939 when he was employed as a sales serviceman in California. He has since traveled as a representative of the company in Europe, Asia, and South America. Before accepting the London assignment, he was sales-training supervisor in Houston.

Homco Elects Lawrence Administrative Vice Pres.

At the recent meeting of the board of directors following the annual stockholders' meeting of Houston Oil Field Material Co., Inc., L. J. (Joe) Lawrence was elected administrative vice president. He is to retain the office of assistant secretary-treasurer to which he was elected in 1952. He was elected to the board of directors in 1953.

Brown & Root, Inc. Elects Minor and Lindsay V. P.'s

L. E. MINOR

H. A. LINDSAY

The election of Louis Edward Minor as vice president of Brown & Root, Inc., and elevating of Hal A. Lindsay to the same position of Brown & Root Marine Operators, Inc., have been announced by George R. Brown, executive vice president of the engineering and construction firm.

Minor, before joining Brown & Root in 1953, was president and co-owner of Oil Field Service Co. and Well Perforators, Inc. Minor began his oil-industry career as a roustabout for Carter Oil Co. and later served as assistant field superintendent.

Lindsay has been with Brown & Root since 1929. He started in sales and promotion work, then went into the company's marine operations in 1947. Lindsay was instrumental in contracting for the first steel offshore platform built by Brown & Root and since then has been associated with offshore platform work of the company.

Pierce Joins O-C-T Sales

Milton Pierce has joined Oil Center Tool Co. sales and service force, John F. Maher, president, has announced. Pierce was formerly with National Supply Co. His headquarters will be in Odessa.

Standard Magnesium Names Chicago Representative

Robert T. Atkins has joined Standard Magnesium Corp., Tulsa, as sales representative for the Chicago area, according to R. M. Wheeler, president. Atkins has been active in sales and sales management for the past 6 years.

Standard Magnesium Corp., a pioneer in the use of magnesium anodes to prevent corrosion on pipelines, well casings, and other underground metal installations, also supplies magnesium ingots to equipment manufacturers.

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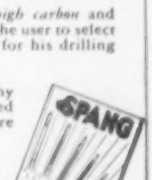

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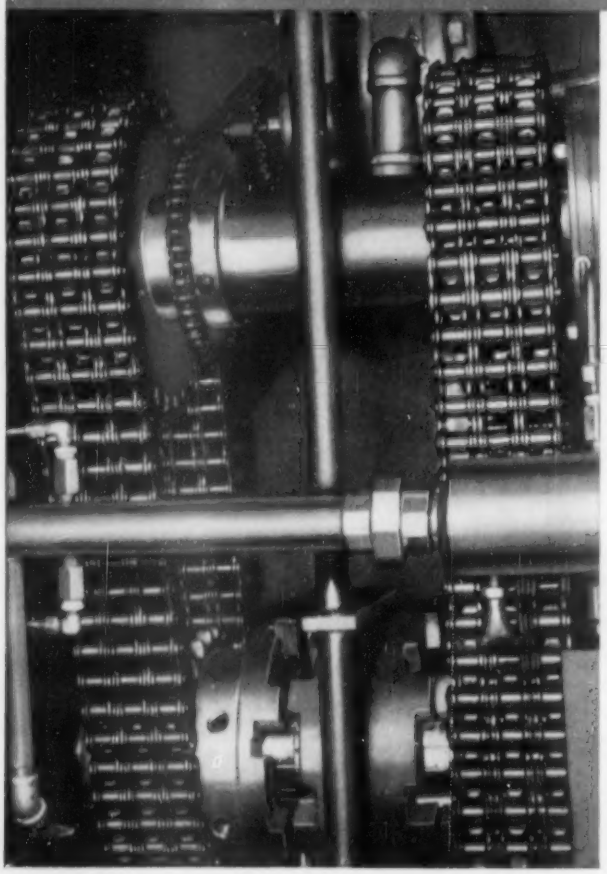

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How to Make an Old Map Exciting

by Frank J. Gardner

THIS map is 28 years old. All we have done is add the oil and gas fields and some important deep wildcats, both old and new.

At the time it was first made, there was no production in Val Verde County. The map accompanied a plea by a capable surface geologist for more drilling there. The Oil and Gas Journal printed it on January 26, 1928, under the title, "Geologic Features of Val Verde County, Texas, and Adjacent Area," by W. R. Calvert. And it's one of the rare references to Val Verde that you can find in the geologic literature.

Recent events . . . Things have been happening in Val Verde County. Important things. That's why we dug up this old map and superimposed those recent events on it. At A, in mid-April, Magnolia Petroleum Co. completed its 1 Morrison as the first Ellenburger gas producer in the county, and the second in the Val Verde basin.

Magnolia's strike points up the dormant promise of the Val Verde basin for future oil and gas fields. Although it registered a small potential (1,182 M.c.f. dry gas per day on ⅜-in. choke), it confirmed existence of commercial Ellenburger reservoirs in the far southwestern counties of Texas. Production at the 1 Morrison came from open hole at 14,168-14,940 ft. and from casing perforations at 13,944-14,062 ft. Operators carried the hole to total depth of 15,143 ft. before plugging back to 14,940 ft.

This new discovery lies 30 miles west of Val Verde County's only other commercial field, the Vinegarone gas field (B on map). Here, R. J. Caraway 1 Guida Rose found Strawn-Pennsylvanian gas at the 10,000-ft. level in May 1951. Later successes by Western Natural Gas Co., Phillips Petroleum Co., and Humble Oil & Refining Co. have expanded the field with four more Strawn producers, and El Paso Natural Gas Co. is taking the production through a 16-in. pipeline.

And early maps . . . Fifteen miles west of the new strike, Calvert's early map showed a large northwest-southeast fold parallel to Pecos River. A dry hole near its southeastern end (referred to only as "the Owens well") had a show of gas in the Pennsylvanian.

RECENT DISCOVERIES and a quintet of deep wildcats now drilling, superimposed upon a 28-year-old surface structure map, provide an interesting glimpse into future possibilities for Val Verde County, Texas.

Just off its northwestern extremity, Terrell County's sole productive field on the Hoge and Goode ranches yielded gas from basal Permian sand at 5,250-5,443 ft. and from Pennsylvanian sand at 5,606-12 ft. Humble, at K on the map, is now drilling its 1 Mills Mineral Tract off the northeast flank of the surface fold.

Other active wildcats now probing the northern part of the county are Stanolind Oil & Gas Co. 1 West (I on map), Phillips 1-A Guenn (M on map), Caraway et al 1 Whitehead (at J), and Humble 1 Wardlaw (L on map). Contract depths on these wells range from 11,500 to 16,000 ft., so it's easy to see that at long last, the southern flank of the Val Verde basin is to see adequate testing. A good idea of the geologic section these wildcats will penetrate was revealed by the log of Phillips 1 Delta-Wilson (H on map.)

In a fertile hunting ground . . . Calvert, in his original paper, made the point that from all subsurface evidence at hand at the time (and that was scanty), his surface folds and faults carried down through the section and were underlain by similar features at depth. This has neither been proved nor disproved to date, but if he was right, then it is obvious that Val Verde deserves many more deep wildcats than it has seen so far. The thick sedimentary section, combined with widespread structural disturbance, should provide a fertile hunting ground.

In the southeastern corner of the county, the long, tenuous folding outlined on the map is believed to overlie a metamorphic ridge. The well at C passed directly from basal Comanchean rocks into highly altered schists at 2,900 ft. At E, the bit went to 4,000 ft. without finding schist. At D, drillers found the base of the Comanchean at 2,900 ft., cut 100 ft. of Pennsylvanian, and went into schists. Seepages of oil from a fault in the Georgetown limestone at San Felipe Springs, east of Del Rio, first attracted drillers to this area but commercial production has never been achieved. At F, a small discovery by Hoblitzelle et al was indicated in 1955, but it has yet to be put on steady production. At G, in Kinney County, a well drilled in 1927 found half a dozen oil and gas showings at depths varying from 500 to 4,265 ft.

Point to neglect . . . A 28-year-old map, plus recent events, indicate that southwestern oil finders have been lax in the search. But perhaps the next 2 years will see Val Verde County at the top of the wildcatter's list.

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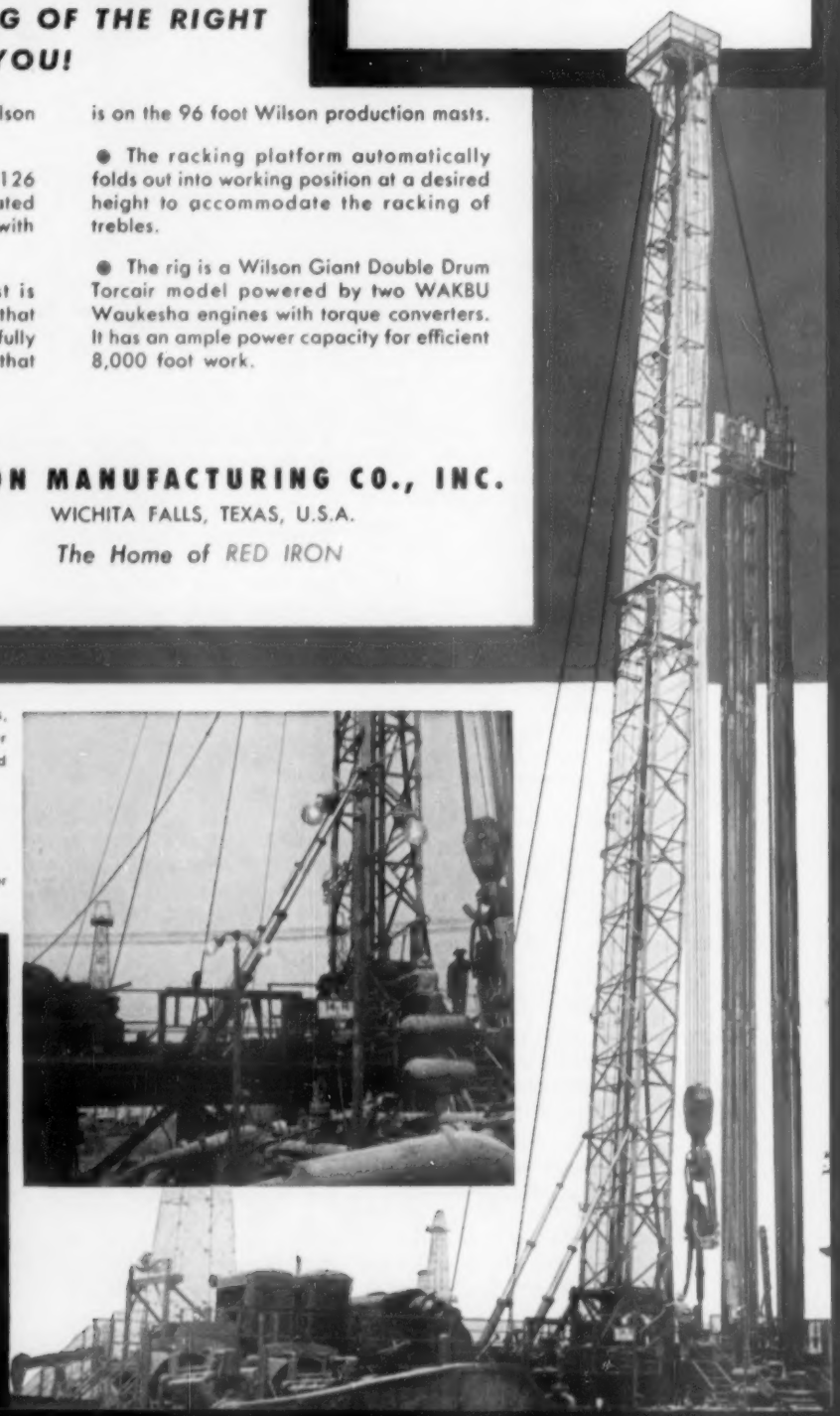

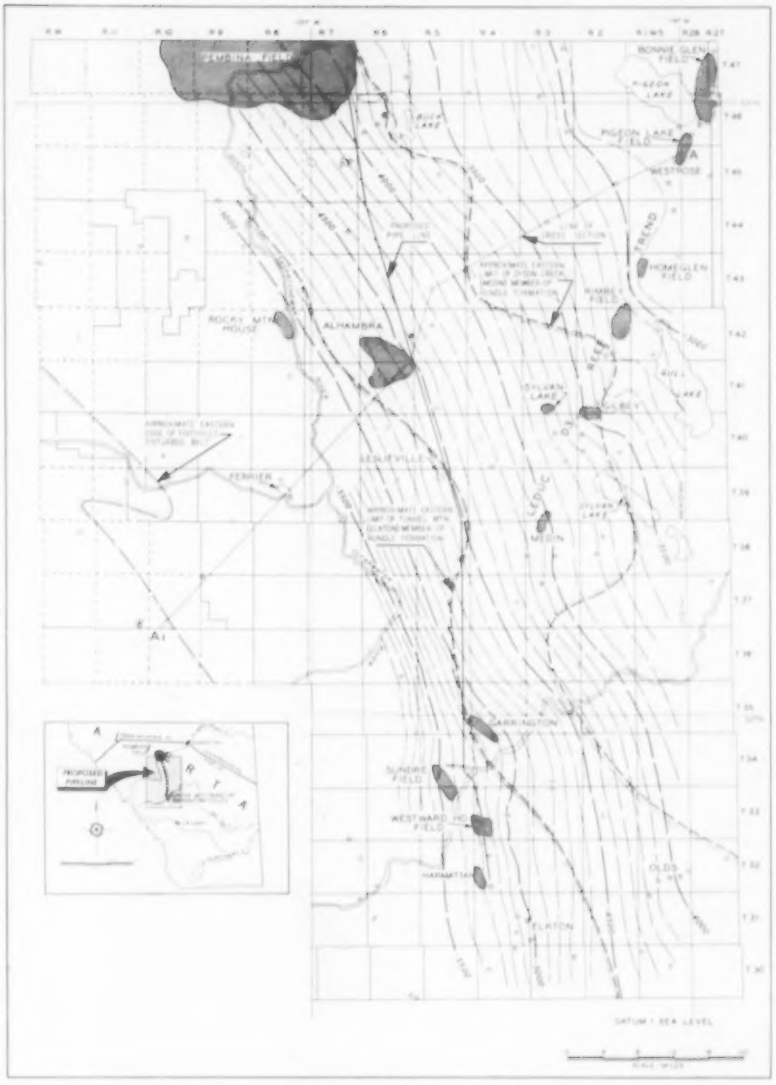

FIG. 1—The east flank of the Alberta syncline already has several important oil and gas fields; contours are on top of the eroded Mississippian surface.

Alberta's Multiple Pays Are Top Wildcat Targets

by J. C. Sproule

THE Sundre-Westward Ho-Harmattan area is one of the most promising relatively undeveloped petroleum-reserve areas in western Canada. As a measure of the possibilities the area provides, consider the few dry holes drilled in the general area relative to the discoveries made.

As a measure of the extent of our ignorance as to the potentialities of the stratigraphic section, we have only to point out that **several of the dry holes have later turned out to be discovery wells for new pools.** As a further measure of the promise of the fields already known, consider the steady increase in newly developed reserves in the area the past 12 months.

Westward Ho, Harmattan, and Sundre fields are located about 12 miles from the Foothills, about 60 miles north-northwest of the city of Calgary and about 80 miles south of the Pembina fields (Fig. 1).

Author is with J. C. Sproule & Associates, Calgary. This is an abridged version of a report prepared for Pembina Pipe Line, Ltd., and presented at a hearing before the Alberta Conservation Board. It is printed with the permission of Pembina Pipe Line, Ltd.

General Geology

The rocks exposed at the surface within the map-area are composed mainly of Upper Cretaceous strata, with a broad northwest-southeast band of Tertiary rocks overlying the Cretaceous in the central portion of the area.

The irregularly bedded character of both the Tertiary and Cretaceous rocks renders structural interpretation difficult, except where relatively high-angle structural attitudes are involved. This situation places a high premium on use of geophysical exploration methods and of subsurface geological interpretations from well data. Surface geological survey methods are useful in some areas and inapplicable in others.

Cambrian . . . One of the thickest sections of Cambrian sediments in western Canadian Plains is believed to be present in the map area. Few tests have penetrated the Cambrian. A recent test, 4-5 East Gilbey, in the Sylvan Lake area, was reported to have obtained 100 ft. of oil on a drill-stem test at the top of the Cambrian below 10,000 ft. With this encouragement, more tests throughout the map area will undoubtedly be drilled deep enough to test the Cambrian, and additional oil of this age will undoubtedly be encountered.

Middle Devonian . . . The Middle Devonian includes the Elk Point formation which, consisting largely as it does of evaporites and shales, is not expected to offer the best possibilities as a petroleum reservoir. It is, however, not unlikely that presently unknown Elk Point facies in this area may later prove to be productive.

Upper Devonian . . . Four rock formations comprise the Upper Devonian in this area. These are the Beaverhill Lake, Woodbend, Winterburn and Wabamun formations. Very little information on the Beaverhill Lake formation in this area is available, but with the anticipated increase in drilling to test the deeper horizons, the Beaverhill Lake formation will probably be more thoroughly explored in future.

The Woodbend formation includes the oil-bearing reef beds of Leduc age. The productive portion of the Leduc reef trend from Westerose south to Medin is relatively narrow, as shown in Figs. 1 and 2. But across the south-

ern part of the map area and in the mountains, a much broader spread of reef of this age is known. The possibilities of Leduc reef discoveries in the southern part of the area west of the proposed pipeline are excellent.

The biostromal Nisku reef forms the lower unit of the Winterburn formation and is widespread throughout much of Alberta. It is locally porous and yields oil in the Medin area. Porosity is known in the Wabamun formation and encouraging shows have been reported from wells in the Garrington and Caroline areas to the north of Sundre. The pooling of oil in the Wabamun and the Nisku may be related to both structural and porosity barriers.

Mississippian . . . The Mississippian includes the basal Exshaw black shale, the Banff formation, and the overlying Rundle formation. The argillaceous nature of the Banff formation within the map area makes it unattractive as a potential reservoir for oil and gas. The Rundle formation includes two beds of varying porosities, separated by a denser member. The upper member, which yields oil at Sundre and Westward Ho and which is locally known as the "Elkton," is the approximate equivalent of the Tunnel Mountain member. The lower porous member, which yields oil at Medin and which is locally known as the "Medin," is the approximate equivalent of the Dyson Creek member.

Some field operators in the area give credit to the Shunda member immediately beneath the Elkton as being productive, but we have been unable to confirm this.

Post-Paleozoic erosion has truncated the Mississippian from southwest to northeast so that in the northeast part of the map area only the nonprospective Banff beds are exposed below the Cretaceous. Two porous members, the Elkton and Medin, are present in the Rundle and these are truncated as indicated in Fig. 3.

It appears that the reservoiring of oil at both the Sundre-Westward Ho area and the Medin area are related to these truncated edges. Future discoveries of Mississippian oil in the map area may, therefore, be expected along these trends to the northwest of presently known production.

Jurassic . . . Jurassic formations occur chiefly in the northwestern part of the map area and along a belt parallel to the Foothills. These beds consist of the eroded or truncated edge of the siliceous Nordegg member and the overlying Fernie shale. Although prospects for this reservoir have only been considered fair, some production has been obtained from it in the Pembina area. Additional oil may be discovered in the updip pinchout edge along the Foothills front.

Lower Cretaceous . . . The Blairmore formation includes numerous suitable reservoir sands and is widely distributed throughout the map area.

The Viking sand, which is a well-known oil and gas producer in the basal Colorado section of the Plains, blends with the top of the Blairmore to the west. The Viking is a widely distributed marine member with varying sand developments. Oil in this member may be accumulated in either structural or stratigraphic traps, but the larger pools are of the latter type. Notable discoveries of Viking oil have been made within the map area in the Sylvan Lake, Gilbey, and Ferrier areas.

Upper Cretaceous . . . The Cardium sand is now the most prolific producing sand in Canada. This formation, known in the Foothills of Alberta as a coarse sand several hundred feet thick, fingers out eastward into a less conglomeratic phase and thence to one dirty, tight sand and shale. The present structural attitude of this formation creates an updip trap of the pinchout type wherever clean, porous sand has been formed by wave-wash and current action. Although porosities and permeabilities are frequently low, the recent development of fracturing techniques has greatly increased the productive potentialities of the Cardium.

The Cardium formation as a marker on electric logs can be traced far out across the Plains, where it is composed almost entirely of silty shale with almost no sand. The entrapment of at least part of the oil in the Cardium formation is related to the

Age	Formation	Lithology	Approx. Thickness (Feet)
PLEISTOCENE & RECENT	"Drift"	Glacial till, gravel and sand	Variable
TERTIARY Paleocene	Paskapoo	Continental, buff and rusty sandstones, claystones, shales, etc.	Continental Series
UPPER CRETACEOUS	Edmonton	Continental grey and buff sands, silts and shales with locally abundant carbonaceous shales and coal.	
	Belly River	Continental grey, to brownish grey and greenish-grey sands interbedded with clays and carbonaceous beds. Southeast of the map-area the Belly River is separated from the Edmonton by the marine Bearpaw shale. To the east the lower Belly River sands finger out into Lea Park shale	3,200 - 6,300
	Solomon	The base of the continental Belly River is transitional with the marine Wapiabi in the Foothills. The Solomon is a marine sandstone, within this transition zone, which lenses out to the east into the marine Lea Park shale.	0 - 100
UPPER CRETACEOUS (Cont'd)	Lea Park	Medium grey marine shales and silty shale thinning to the west.	150 - 450
UPPER CRETACEOUS Colorado	Wapiabi	Marine dark grey shales and sandy shales, calcareous concretions at some horizons. Calcareous white-specked shale marks Colorado top on the Plains.	500 - 1500
	Cardium (Bighorn)	Marine sandstones and sandy shales, thinning and becoming silty to the east. In Foothills Cardium consists of two sand zones with intervening shale.	0 - 300
	Blackstone	Marine dark green shales with limy and sandy zones including the Jumpingpound sand which is approximately the equivalent of the Second White Speck zone.	700 - 1100
LOWER CRETACEOUS	Blairmore	Continental to marine grey to greenish-grey glauconitic sands and dark grey sandy shales, with some coal beds. Upper Blairmore sands of Foothills become well defined Viking marine sand of Plains.	700 - 1200
JURASSIC	Fernie	Marine dark grey and brown sand and sandy shale with basal calcareous siliceous member.	0 - 300
MISSISSIPPIAN	Rundle	Limestones and dolomitic limestones, light buff to grey. Three members are included, two of which, the Tunnel Mountain (Elkton) and Dyson Creek (Medin), are porous in varying degrees.	0 - 1000
	Banff	Dark grey, brown and black argillaceous and silty limestones with interbedded grey, brown and black calcareous shales.	0 - 600
	Exshaw	Brown-black petroliferous shale.	0 - 30
UPPER DEVONIAN	Wabamun	Dolomites, in part cherty and argillaceous with some porous zones (D-1). Also varying amounts of white to brown anhydrite.	600 - 800
	Winterburn	Dolomite, silty dolomite and silt and anhydrite. Irregular porosity in basal biostromal Nisku Member (D-2).	200 - 500
	Woodbend	Argillaceous limestone and dolomite and green shale with local porous dolomite developments of Leduc age reef (D-3). Basal member in large part fragmental limestone.	900 - 1200
	Beaverhill Lake	Limestones, argillaceous limestones and shales in places, anhydritic and dolomitic.	500 - 700
MIDDLE DEVONIAN	Elk Point	Dolomite, shale and evaporites.	300 - 500
CAMBRAIN	Unnamed	Sandstone and green and red shale with minor amounts of limestone.	900 - 2900
PRECAMBRIAN	Basement Complex	Crystalline igneous and metamorphic rocks.	

FIG. 2—The stratigraphic column shows several possible pay zones at intermediate drilling depths.

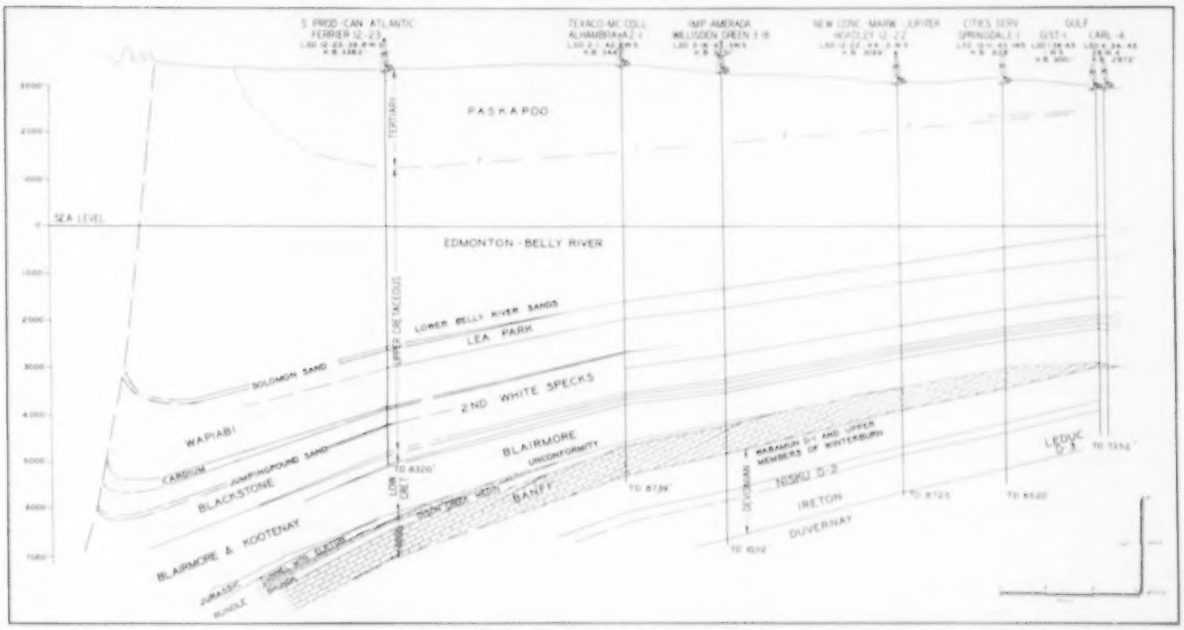

FIG. 3—Numerous pay zones are present in the Sundre-Westward Ho-Harmattan area at drilling depths of 5,000 to 10,000 ft.

eastern limit of the effective sand. The line drawn on Fig. 1 to indicate the approximate position of this pinchout is based on a study of the available information from wells drilled through the Cardium. The locations of the Garrington, Leslieville, Alhambra, and Rocky Mountain House Cardium discoveries obviously bear a relationship to this pinchout line.

When one considers the tremendous size of the Pembina field development (Figs. 1 and 3), the extent of the stepout discoveries to the south of the Pembina fields, and the very high discovery rate in relation to the density of drilling between Pembina and the Sundre-Westward Ho fields, the Cardium po-

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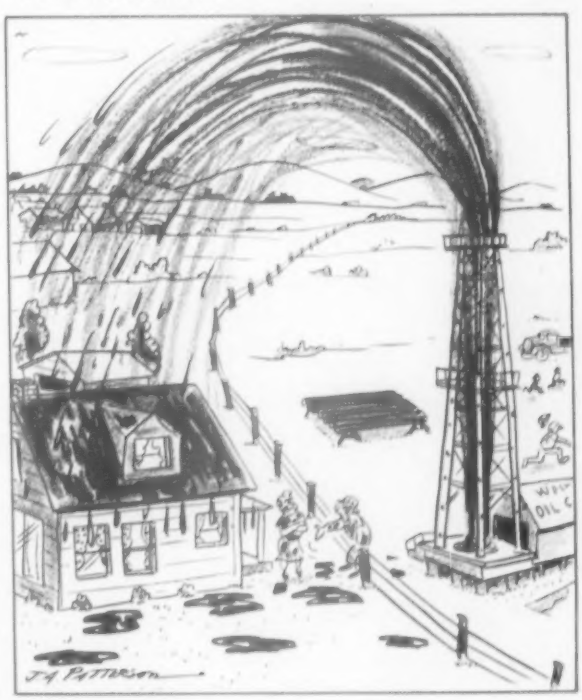

"We feel we owe you an apology."

tential along the line of the proposed pipeline of Pembina Pipe Line, Ltd., is obviously great.

In addition to the Cardium sand, other Upper Cretaceous sands in this area pinch out eastward in a similar manner. The whole Upper Cretaceous section thickens rapidly to the west of the pipeline route, largely as the result of the increase in sand content. These sands are prospective—they have updip pinchout edges in marine shales.

As an example, the Jumpingpound sand, which is roughly correlative with the Second White Specks zone on the Plains, undoubtedly pinches out somewhere in the western part of the map area and offers possibilities for oil and gas entrapment. Shows have already been reported from the Second White Specks zone.

The Solomon sand is a marine deltaic sand occurring within the transition zone between the marine Wapiabi shales and the overlying continental Belly River sands in the Foothills. To the east, the Solomon sand (or sands) finger out into the Lea Park shale and produce suitable reservoirs for oil and gas. Sands in the lower part of the Belly River formation produce oil in the Buck Creek area at the north edge of the map area, and possibilities for other discoveries in these lower Belly River sands are present.

Tertiary . . . The Paskapoo formation is entirely nonmarine and relatively nonprospective for oil and gas.

Structural Geology

Structurally, the map area (Fig. 1) is located on the east flank of the so-called Alberta Syncline, the axis of which is customarily placed in or near the eastern edge of the Foothills. Except in the Foothills, outcrops of bedrock throughout the map area are limited to deeper stream valleys. The regional structural control is somewhat limited because of the small number of wells that have been drilled. Enough subsurface information is available, however, to indicate that the regional dip is to the west at a rate of about 60 ft. per mile on the Cardium horizon and somewhat steeper on the eroded Mississippian surface, with the rate of dip increasing westward.

The cross-section, Fig. 3, illustrates this increasing dip toward the west. The geological formations encountered in the drilled tests outcrop in the Foothills. The surface information, combined with the well information, indicates that most of the formations thicken from east to west—either as a result of differential initial sedimentation or truncation by erosion, or both, as has been indicated on the cross-section.

The regional strike of all bedrock formations in the area is northwest-southeast. Local departures from this regional strike will appear with increased density of well control in the vicinity of structural features. The Westward Ho-Harmattan-Sundre structures provide a good example of this.

With increased density of well control, the significance of changes in the structural attitude with respect to the distribution of facies and the accumulation of oil will also become more apparent. For example, such a feature as the sharp "Z" in the eastern edge of the Foothills Disturbed Belt west of Ferrier field (Fig. 1) suggests the probability of significant subsurface structure in the adjacent Plains area.

Future Prospects

Future prospects for discovery of additional oil reserves along the proposed pipeline route from Sundre-Westward Ho to Pembina can only be described in very general but decidedly optimistic terms. Although very few wells have been drilled in the area through which this pipeline route is proposed, the discovery rate has been high and the prospective zones are probably more numerous than in any other area of Alberta.

The Cardium, with its tremendous potential, must at this time be rated as the best prospect. In addition to this,

Otis..."First in Pressure Control"

the strike of the pinchout edges of the two porous Mississippian zones also runs close to the pipeline route, and the possibilities for discovery of additional Mississippian fields of the Sundre-Westward Ho type in an almost untested area are obvious.

While not necessarily coinciding with the Cardium sand pinchout, the pinchouts of other Cretaceous sands (such as the lower Belly River sands, the Solomon sand, and the Jumpingpound sand must also occur in the area between the Cardium sand pinchout line and the Foothills Belt.

The Viking sand discoveries at Sylvan Lake, Gilbey, and Ferrier indicate that increased drilling will almost certainly reveal additional oil reserves in this formation. Blairmore sands are also widespread and, though inclined to be unpredictable, should yield substantial amounts of oil. The Jurassic beds also pinch out somewhere to the east of the Foothills edge, and possibilities for oil accumulations in sand pinchouts are excellent.

Devonian possibilities occur in several members, including the Wabamun, Nisku, and Leduc. As previously stated, a recent show of oil in the Cambrian in this area is likely to ensure the deeper drilling of many holes.

EXPLORATION HIGHLIGHTS

APPALACHIAN

PENNSYLVANIA

In Gaskill Township, Jefferson County, Southwest Pennsylvania, drilling operations are under way in another wildcat test. It is Columbian Carbon Co. 1834 Harriett McClure et al, elevation 1,640 ft., on the Punxsutawney Quadrangle, approximately 4.10 miles south of latitude 41 degrees 00 minutes and 3.85 miles west of longitude 78 degrees 45 minutes.

WEST VIRGINIA

Dry Fork district, Randolph County, West Virginia, Hope Natural Gas Co. announced 9986 West Virginia Evergreen Co., rank wildcat, elevation 3,023 ft., Horton Quadrangle, 4.23 miles south of latitude 38 degrees 50 minutes and 2.25 miles west of longitude 79 degrees 40 minutes.

● In Middle Fork district, this company will make an effort to extend the pool on the Hiram anticline. No. 9994 Maude B. Moore et al, elevation 3,064 ft., has been located approximately 2½ miles southwest of present production, Sago Quadrangle 5.30 miles south of latitude 38 degrees 50 minutes and 1.04 miles west of longitude 80 degrees 05 minutes.

OHIO

A further indication of Clinton production under the Newburg sand pool in Madison Township, Licking County, was found by the Jebb Oil & Gas on 1 U. S. A., Lot 6. Sand at 2,622-50 ft. filled up 1,200 ft. natural and gaged 250 bbl. in a 24-hour test after fracture.

A ½-mile stepout by George Sheaf

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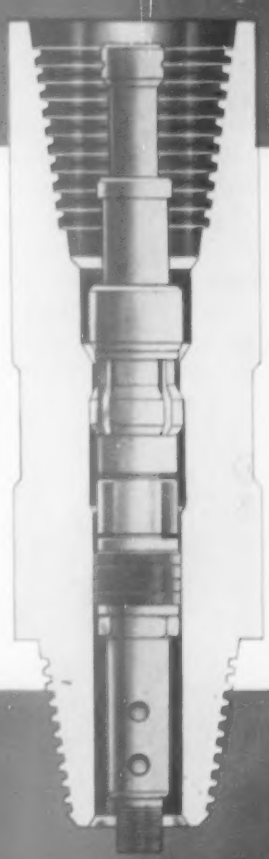

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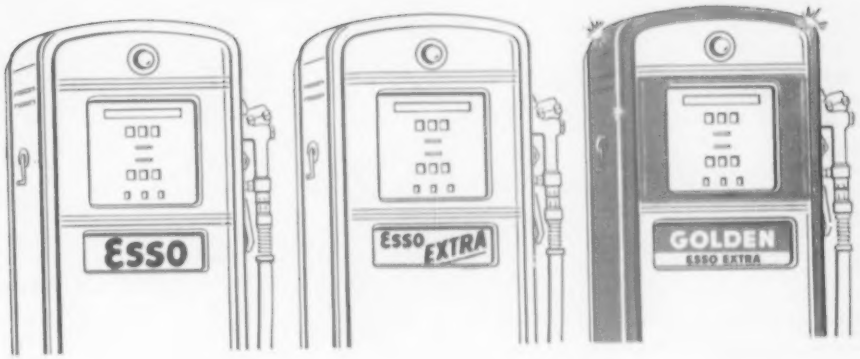

SAVINGS OF MILLIONS of dollars for the American motorist are possible through a three-grade system of marketing gasoline. On June 20, our company will begin marketing three brands of gasoline – Esso at "regular" price, Esso Extra the premium grade, and now new Golden Esso Extra, a still higher quality fuel for automobiles with high-compression engines. This new power fuel should be available to 75 per cent of our company's customers by mid-August.

In announcing the higher quality motor fuel, our company moved about four years ahead of schedule. The new gasoline contains power-producing elements of an advanced motor fuel that was originally scheduled for production by Esso in 1960.

Motorists are demanding cars with better performance, and to deliver performance most efficiently, automobile manufacturers have increased compression ratios. These higher ratios demand a higher grade of fuel. Our new gasoline is designed to meet that need.

Traditionally, the petroleum industry has marketed two grades of gasoline – regular and premium. Recently, however, an acute problem arose from the increasingly greater percentage of new cars which are not satisfied by existing premium gasolines.

We decided that merely increasing the octane rating of the current premium grade would be uneconomical to the millions of motorists whose automobiles cannot take full advantage of a higher grade of fuel.

Obviously, if only two grades – regular and a new higher quality premium fuel – were marketed, many motorists would be caught in the middle. The "quality spread" between the two motor fuels would be far too wide.

Both the motorist and the oil industry save when the proper fuel is used in an automobile engine. The three grades system will accommodate all cars, new and old, and save many motoring dollars.

The current regular and premium grades of gasoline are doing an outstanding job for a large percentage of the motoring public and will continue to do so for some years to come. Since higher quality fuel must be made by new processes that are more costly, Esso Standard feels it would be unfair to most motorists at this time to increase the octane and other qualities – and cost – of our present premium fuel.

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President

ESSO STANDARD OIL COMPANY

& Co. on I C. W. Speakman, Section 4, Perry Township, Coshocton County, resulted in a producer that gaged 50 bbl. in an 8-hour test after frac. Clinton was logged at 3,267-3,304 ft. with a fair showing natural.

● Ditch & Hanna 1 L. B. Reiss, Section 8, Monroe Township, Coshocton County, an extension to an old gas pool, gaged 80 bbl. with 600,000 cu. ft. gas from fractured sand at 3,265-82 ft.

EASTERN KENTUCKY

On Stonecoal Creek in Pike County, Kentucky West Virginia Gas Co. has completed 5914 Nathaniel Gilliam as a Devonian brown shale gas producer. Drilled deeper from 1,566 ft. in Mississippian Maxon sand test topped Big lime at 1,760 ft., Weir sand at 2,045 ft., Berea sand at 2,455 ft. and Devonian shale at 2,575 ft. Bottomed at 3,297 ft. in shale, well tested after shot at the rate of 103,000 cu. ft. of gas daily with a 24-hour rock pressure of 205 lb.

In the Pike County sector of Big Sandy gas field Columbian Carbon Co. has completed a good well at 1393 Earl D. West et al., located on Williamson Branch. Bottomed at 2,049 ft. in Weir sandstone of Mississippian age, well tested natural at the rate of 5,116,000 cu. ft. of gas daily.

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MID-CONTINENT

OKLAHOMA

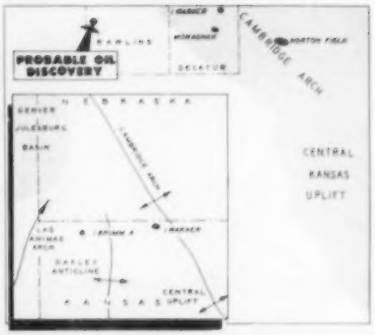
Layton Strike in Kingfisher Completed

An important wildcat for the Anadarko basin region west of the Nemaha ridge in Kingfisher County, north-central Oklahoma, was completed last week by Tennessee Gas Transmission Co.

The 1 Oltmans, NE SW NE 24-18n-5w, flowed 241 bbl. of oil in 24 hours on 18/64-in. choke on final test. The well also flowed 2,425 M.c.f. of gas per day through Skinner sand perforations at 6,032-42 ft. The well is in the Lovell district.

Short Junction Report

Two more wells have been added to Cleveland County's prolific and fast-growing Short Junction field. Ohio Oil Co. finaled the 1 Grove, C SE SE 18-10n-3w, for 247 bbl. of oil per day on 20/64-in. choke from perforations at 7,817-38 ft. in the Hunton lime.



Two wells in northwestern Kansas stirred hopes of making this vast unexplored region a future petroleum province.

KANSAS

First Production Seen For Rawlins County

An indicated oil discovery in northwestern Kansas' Rawlins County promises first production for this area of the state. Miami Operating Co. 1 Brumm "A," 43 miles northwest of nearest production at Pollnow pool, recovered 3,800 ft. of gas, 270 ft. oil and 30 ft. oil-cut mud on a drill-stem test in the Pennsylvanian sand at 4,410-22 ft., open 2 hours.

Other tests at the wildcat got 15 ft. oil and 30 ft. mud, and 10 ft. oil and 30 ft. mud. The first test uncovered 60 ft. of oil and 60 ft. oil-cut mud.

The Rawlins discovery prospect is the second in as many weeks in the northwestern region of Kansas. Earlier, Cities Service Oil Co. pumped 200 bbl. of oil per day at the 1 Warner wildcat in NE NE NW 11-1s-27w, Decatur County. This Lansing-Kansas City Pennsylvanian discovery is 10 miles northeast of Oberlin, Kans., and 6 miles north of closest oil production in Monaghan field. The two wildcats show great promise of making one of the lonely wildcat provinces of Kansas and Nebraska productive areas.

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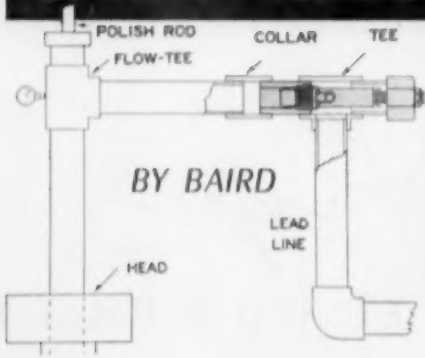

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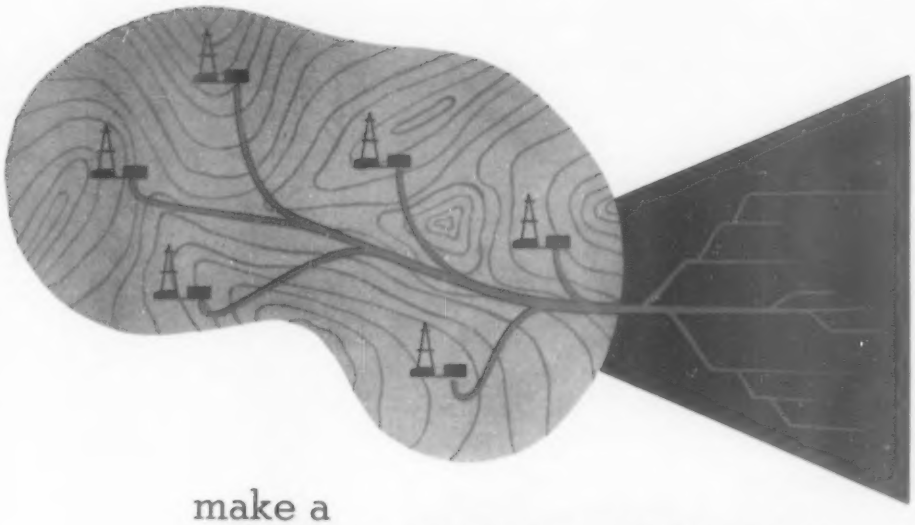

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Earlier predictions of increased activity in the Cambridge arch and northern Las Animas arch areas now seem to hold weight. Location of the Cities Service well is on the western flank of the south end of the Cambridge arch, a huge Nebraska and extreme northern Kansas structure with only one producing area . . . Norton field. Last year hopes were stirred at a Hitchcock County, Nebraska, wildcat. After several months of tests this well was finally abandoned. Several years ago Pennsylvanian production was brought in at a wildcat in Cheyenne County, extreme northwestern Kansas. This Judy pool discovery well later was closed down.

The two northwestern Kansas counties. Cheyenne and Rawlins, are the east flanks of the Las Animas arch which runs northeast-southwest through the northwest corner of Kansas down to southern Colorado. There is scattered production at the north end of the Central Kansas uplift, but little hope was held for the southern portion of the Cambridge arch until Norton pool was opened. The Decatur and Rawlins County wildcats could change all this, reviving interest that lagged after the development of Norton pool.

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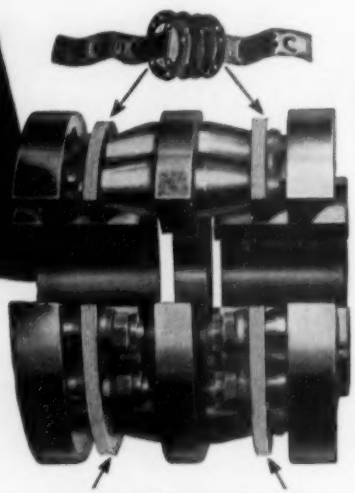

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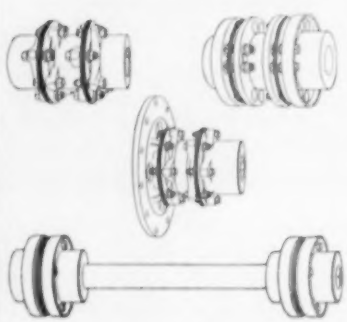

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New Book

Rinehart Oil News Co., Box 1208, Dallas, Tex., has released the Ira Rinehart's Yearbook 1956, a two-volume edition covering exploratory developments throughout the nation in 1955. This is a statistical and graphical summary of 1955 well information, compiled and edited by the staff at Rinehart's Special Publications Department.

Correction

The Journal failed to give credit to the Midland Map Co. for providing the base map of the illustration on page 179 of the May 7 issue, 1956. Title of the paper was "What's the Outlook for the Permian Basin."

ARK-LA-TEX

NORTH LOUISIANA

Exploration in April Netted Two New Pays

Two new-pay discoveries were completed in North Louisiana during April. One of these new strikes was in Homer field, Claiborne Parish; the other in Sibley field, Webster Parish.

Homer . . . Maritzky & Bibby 7 W. M. McClung estate, NE SW 29-21n-7w, opened Bodcaw sand production in the Cotton Valley formation in Homer field.

The well flowed 96 bbl. of oil per day through 8/64-in. choke from perforations at 4,950-56 ft. Gravity of the oil was 34.8°. Earlier, Cotton Valley production had been opened in the field with a Davis sand discovery well. The field produces from Nacatoch, Chalk, and Tokio.

Sibley . . . Jack W. Grigsby completed the 1 Burson-Cooke, C S½ SE SE 27-18n-9w, as a new-pay discovery in the Glen Rose formation of Sibley field. The well flowed 56,000 M.c.f. of gas per day from perforations at 4,581-86 ft. in a stray sand of the upper Glen Rose. The field produces from Glen Rose, Rodessa, James, and the Travis Peak.

EAST TEXAS

Smith County Pettit Strike Sets Off Lease Play

A lease play was reported near the town of Arp in southeastern Smith County, including lots in the townsite, based on a Pettit discovery southwest of Arp, and a Woodbine prospect on the southern edge of the town.

The discovery or expansion, is Sam Trant 1 James Franklin, 2 miles south-

west of Arp and about 1 mile east of production in Good Omen pool. Operators were ready for completion after running pipe to bottom at 8,125 ft.

On drill-stem tests at 8,072-80 ft. the well flowed at the rate of 12.5 bbl. of oil an hour through 12/64-in. choke, under tubing pressure of 1,500 psi. Perforations at 8,040-48 ft. also tested oil but the amount was not disclosed at this writing.

Pettit production in Good Omen field is around 8,100 ft. Locations have been staked for two tests between the field and 1 Franklin.

On the south edge of Arp, H. R. Stroube, Jr., 1 Wilson was drilling ahead below 3,952 ft. after finding oil shows in the Woodbine. A drill-stem test at 3,885-3,915 ft., open 15 minutes, recovered 90 ft. of oil and gas-cut mud, plus 1,740 ft. of salt water said to be nearly half oil. Location is in the James Jordan Survey.

Cherokee County gas shows . . . D. D. Feldman Oil & Gas Co. 1 Biddle, wildcat 8½ miles northeast of Alto was said to have had gas shows in dense lime cored at 8,580-8,661 ft. but reports were unconfirmed. Operators were coring ahead below 8,770 ft.

Red River County . . . Don Fitzwater has completed his 1 H. A. Cole as a pumping discovery, in the Paluxy sand. On test, from open-hole section at 1,769-86 ft., the well made 20 bbl. of 15° oil a day. Location is in the Whitfield Moore Survey, 15 miles northeast of Detroit.

ARKANSAS

Sebastian County Gas Well Has Good Flow

A good gas flow was reported at Reynolds Mining Corp. 1 C. W. Turner, new gas well in Sebastian County, west-central Arkansas. The discovery flowed 4,240 M.c.f. per day on ½-in. choke from perforations in the Atoka-Pennsylvanian at 2,55596 ft. Location of the discovery well is in 27-6n-30w, 4½ miles southeast of Greenwood, Ark., and 4½ miles west of Washburn.

The well is 2¼ miles east of Gragg field, a 1955 discovery that made 909 M.c.f. per day. The discovery well was the Gragg Pipeline Co.-Reynolds 1 Boyde, C SE SE NW 29-6n-30w.

April Discovery Pace Up Over Previous Month

Four wildcats in Arkansas hit oil in April.

Southwest Willisville . . . C. G. Davis opened Southwest Willisville-Nacatoch field in Nevada County, southwestern Arkansas at 1 Page, NE NE SW 30-14s-21w, 1¾ miles southwest of the town of Willisville. Two more wells were added recently. Production is from the Nacatoch at 1,208-14 and 1,217-24 ft. The well pumped 21 bbl. of oil per day, 14.6° gravity.

Strong area . . . This Union County area was re-opened to production at Tandem Drilling Co.'s 1 Trammell in C NE SE NW 28-18s-12w. The well pumped at the rate of 70 bbl. per day, 35° gravity. Perforations were in the Cotton Valley at 4,968-74 ft.

Sheppard extension . . . Sneed Brothers extended Sheppard field on the east side of El Dorado in Union County at 1 L. F. Sample estate, C SE SW NW 27-17s-15w, 1½ miles southwest of East El Dorado field. The well pumped 58 bbl. of 36°-gravity oil per day from perforations in the Nacatoch sand at 2,205-17 ft.

New pay at Beech Creek . . . Gulf Refining Co. et al., opened Cotton Valley sand oil production in the Beech Creek field area, Union County. The well pumped 23 bbl. of 34°-gravity oil per day from perforation at 6,609-18 ft. Location is ¾ mile northeast of Wesson and ⅞ mile northwest of the Beech Creek field discovery well which is abandoned. The well reopens the field.

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Panhandle Eastern Pipe Line Co.'s 3-4 Woodward gas well in foreground with a Panhandle Eastern oil well in background. Location is North Richland Center field, inside Hugoton gas field, Texas County, Oklahoma.

Panhandle Eastern 2-24 Ballew near Guymon, Texas County. At valve is Lex Phillips, a division superintendent.

Panhandle Eastern to Drill 60 Hugoton Wells

PANHANDLE EASTERN PIPE LINE CO. announced plans for drilling at least 60 wells, the majority of them to depths below the shallower zones from which gas has normally been found within the Hugoton embayment. The accelerated program started late last year and has been spurred by a number of successful deep wells in the Oklahoma Panhandle in recent weeks.

Included in the 1956 over-all program are 21 relatively shallow wells in the Hugoton and Greenwood fields, 25 oil wells, 9 deep gas wells adjacent to recent discoveries, and 5 deep wildcats. The deep wildcats will be drilled on large blocks of leases held by the company.

The deeper discoveries found to date have bottom-hole pressures up to 1,650 psi. Much of the company's deep drilling is to a depth below 6,000 ft. in the Morrow sand. Panhandle's current deep drilling is centered in Interstate and Taloga fields in Morton County, extreme southwestern Kansas; in northern Texas County, and in the eastern central part of Texas County, Oklahoma Panhandle.

Interest high . . . Exploratory and development interest is extremely high in

LARKIN LEADERSHIP HAS BEEN EARNED

Panhandle Eastern Pipe Line Co. will drill 60 oil and gas wells in the southwestern Kansas and Oklahoma Panhandle region of the Hugoton embayment.

the Oklahoma Panhandle portion of the Hugoton embayment. Recent successes in both Texas and Beaver counties have enhanced the region's prospects of becoming a major oil and gas-producing province. Accent is on deeper drilling in this region where only Permian gas production was known until a few years ago.

Big Greenwood field in southwestern Kansas is the largest of the new gas-producing areas in this region. Production is from the Topeka-Pennsylvanian. The field extends into Baca County, Colorado. Further west of Greenwood field in Baca County there are indications of first oil production for the county at Provincial Oil Corp.'s 1 State in C NW SE 36-32s-43w. The operator is running production casing after recovering oil from the Marmaton-Penn at 4,168-4,241 ft.

SOUTHWEST KANSAS

Mississippian Pool Opened in Meade

Meade County has a new Mississippian discovery at James Donoghue 1 Schell in C NW NW 4-34s-30w. The well flowed at the rate of 5,200 M.c.f. daily from perforations at 5,815-86 ft.

GULF COAST

LOUISIANA OFFSHORE

Second Sand Producers in Ship Shoal Block 67 Field

Ocean Drilling & Exploration Co.'s second well in its Ship Shoal Block 67 field, in the Gulf of Mexico, 3 miles off the coast of Terrebonne Parish, opens another pay zone, 2,300 ft. shallower than that of the discovery well.

The new pay is perforated at 9,702-9,800 ft., and is productive of gas and condensate. The discovery well, completed last November, was oil-productive from sand at 12,137-41 ft.

Production of the second well tested 194 bbl. of 42°-gravity liquid per day

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through ⅛-in. choke with gas-liquid ratio of 6,856 cu. ft. per barrel. Pressure was 3,075 psi. Hole was drilled to 12,332 ft. and has casing to 11,000 ft.

Main Pass 47 Field Gets Two Additional Pay Zones

Two additional sands have been opened in Main Pass Block 47 field, in Breton Sound, off the east coast of Plaquemines Parish. They give the field four proved pay zones with three wells.

Discovery well of one of the new sands is Kerr-McGee Oil Industries, Inc., 1-D State Lease 1268. The sand, perforated at 9,020-42 ft., produced at the rate of 1,819,000 cu. ft. of gas with 36.4 bbl. of 56.4°-gravity liquid per day. Flow was through an adjustable choke.

The other new pay in a workover of Kerr - McGee's field - discovery well, originally completed last July in an 8,200-ft. sand. The workover completion was at 7,896-7,900 ft., flowing 204 bbl. of 32°-gravity oil per day through ⅛-in. choke under pressure of 800 psi.

The field's other well, completed last September, was productive of gas and condensate from a 7,700-ft. sand.

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SOUTH LOUISIANA

Gas-Condensate Discovery Completed in Jeff Davis

Frankfort Oil Co. is calling completed its Fontenot wildcat test in northern Jefferson Davis Parish. It opens a new gas-condensate area, following a series of tests in several Cockfield-Yegua zones.

Completion pay is perforated at 8,372-82 ft., from which the well flowed 470,000 cu. ft. of gas daily through ⅛-in. choke with pressure of 2,500 psi. Gas sprayed 58.8°-gravity condensate with gas-liquid ratio of 150,000 cu. ft. per barrel. The well is shut-in pending final potential gage.

Tests at 8,304-07 ft. and 8,296-8,300 ft. also produced gas and condensate. Tests of deeper zones failed to indicate commercial production.

Location is about 3 miles northwest of the Edna area, nearest production, and about 5 miles south of the large Kinder field, in Allen Parish. It is 1 mile from the Allen Parish line.

Development Continues Active at Anse La Butte

Development around the old Anse La Butte dome, on the St. Martin-Lafayette parish line, continues active. Two additional wells were completed last week. Four rigs are working in the vicinity.

New wells were completed by Austral Oil Exploration Co., Inc., and Munoco Co. Austral's well, on the southeast flank of the dome, is good for 114 bbl. of 33.5 bbl. of oil per day through 9/64-in. choke. Completion was at 7,682-7,700 ft. with bottom of hole at 7,913 ft.

Munoco completed its 1 Myrna at 3,015-18 ft. making 54 bbl. of 31°-gravity oil per day through 3/32-in. choke. Hole was drilled to 3,654 ft.

TEXAS

Colorado County Wildcat Opens New Wilcox Field

W. U. Paul is opening a new Wilcox field in northeastern Colorado County where his 1 Miller, in the Ben R. Thomas ⅓ League flowed 65 bbl. of 35.6°-gravity oil per day through ⅛-in. choke during pre-potential tests. Flow was under pressure of 300 psi.

The well was drilled to 10,214 ft., and has casing to 9,800 ft. Pay zone is perforated at 9,688-96 ft.

Location is 15 miles northeast of Columbus. Nearest production is in the Frelsburg area, 5 miles northwest.

Cameron Deep Wildcat Given Up As Dry Hole

South Texas' third deepest test is being abandoned as a dry hole.

It is Magnolia Petroleum Co.'s rank wildcat, 1 Kerlin, 17½ miles north of Port Isabel, on Padre Island, Cameron County, at the state's southern tip.

Its total depth is 17,166 ft. The area's deepest test, also drilled by Magnolia, was in West Ranch field, in Jackson County, central coastal district. It was drilled to 19,060 ft. Dry at that depth it was plugged back and completed last November in the field's 5,100-ft. sand.

Second deepest test was a 17,966-ft. hole drilled in 1951 by Superior Oil Co. in Portilla field, northeast of Sinton, in northern San Patricio County, also in the central coastal district.

Before abandoning its Cameron County test, Magnolia plugged back to 11,950 ft., and perforated casing, cemented at 12,505 ft., at 11,878-90 ft., where it tested salt water.

Atascosa Wildcat on Pump

Goldston Oil Corp.'s new discovery well, 1 Moursund, 2 miles southwest of Jourdanton, in Atascosa County, produced 34.90 bbl. of 39°-gravity oil per day during completion tests. Completion was on the pump, with production from Navarro sand, perforated at 4,920-38 ft. Total depth is 4,950 ft. No water was indicated.

WEST TEXAS-NEW MEXICO

WEST TEXAS

Southern Ector County Wildcat Flows Devonian Oil

White Eagle Oil Co., Freeport Oil Co. and Panhandle Oil & Refining Co. 1-32 Edwards Ranch, wildcat 11 miles south of Odessa in Ector County, flowed oil from a Devonian section, then cored ahead into the Fusselman.

The section tested was from 12,000-160 ft. The tool was open 7 hours and 45 minutes and 1,500 ft. of water blanket was used. Gas surfaced in 30 minutes, making 151 M.c.f. initially and 115 M.c.f. after 4 hours. Oil reached the top in 6 hours and 20 minutes, tanking 9.96 bbl. the first 30 minutes and 10.13 the next 30 minutes, for a total of 20.09 bbl. in 1 hour.

Bottom-hole flowing pressure from 875-1,645 psi., and 45-minute shut-in pressure read 5,098 psi.

Top of the Devonian was 11,117 ft.,

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Style WF
new wide-vision frame shape in flesh-color butyrate, spatula or half plastic-half cable temples

Style WFD
demi-amber wide-vision butyrate frame; matching spatula temples

Style WFB
popular Willson Bronze, wide-vision frame; spatula or half plastic-half cable temples

Style WFH
wide vision lenses, spatula temples—in new half-frame design (demi-amber overlay on upper half of crystal butyrate frame)

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on elevation of 2,948 ft. Other possible production zones include the Grayburg and two Pennsylvnian lime sections.

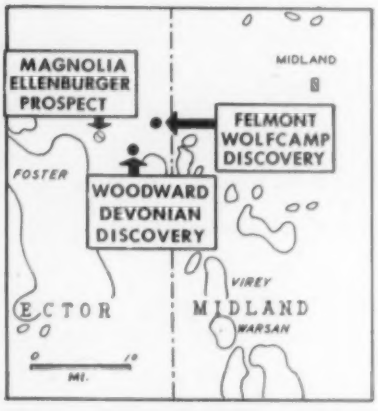
Ector County . . . Magnolia Petroleum Co. 1 Sallie Ratliff, northeast of Odessa, continued testing in the Ellenburger. Initial tests through perforations at 13,630-73 ft. swabbed 21 bbl. of oil in 4 hours. After treating with 4,000 gal. of acid, operators swabbed 79 bbl. of 52° oil and 35 bbl. of water in 24 hours.

This well has indicated production from the Leonard, Fusselman, and Devonian on drill-stem tests. Location is 2½ miles southwest of the one-well Ratliff-Ellenburger field.

Monterey Oil Co. and Felmont Oil Corp., with the latter as operator, have completed a Wolfcamp discovery 7 miles northeast of Odessa. On 10-hour potential test the well flowed at the rate of 360 bbl. of 42° oil a day through ½-in. choke, from perforations at 10,020-52 ft. Tubing pressure was 100 psi. and gas-oil ratio was 1,408:1. Location of the discovery is in Section 33, Block 41, T1N, T&P Survey.

Felmont and Montgomery jointly own 3,500 acres in the area of the discovery. Plans were being made for drilling extension wells, the first of which will be spudded within 2 months.

Reeves County Delaware sand strike, flows 10-11 bbl. an hour. Ford Chapman & Associates 1 Ramsey 18, made potential of 267 bbl. of oil a day through ¼-in. choke, from 13 ft. of pay at 2,640-53 ft. Location is on a Continental Oil Co. farmout in 18-57-T1-T&P Survey.



Map shows location of Felmont Oil Corp.'s Wolfcamp discovery northeast of Headlee field; Magnolia Petroleum Co. 1 Sallie Ratliff, multipay prospect, and Woodward & Co.'s recent Devonian discovery, or extension to Headlee field.

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PACIFIC COAST

CALIFORNIA

Texaco Scores New Gas Pool Find

The Texas Co. scored a new gas pool discovery in the Georgiana Slough area of River Island field in Sacramento County. Texaco completed 2 Arthur Brown, located 1 mile northeast of production, for 2,000 M.c.f. of natural gas daily through a 5/16-in. choke. The

producing interval of this 3,134 ft. discovery is 3,170-3,230 ft.

Union Nearing New Stevens Zone Field

Union Oil Co. was preparing to complete 73-2 Smith for a probable lower Stevens zone new field discovery in the Strand area west of Bakersfield in Kern County. Union has plugged back the 10,163 ft. wildcat to 9,815 ft. and set pipe, including 69-ft. of perforations, to 9,810 ft. A successful water shut-off test was made at 9,722 ft. and the operator was cleaning out the hole for the completion try.

This wildcat is located 1½ miles northwest of Shell Oil Co.'s recent Stevens and Vedder discoveries in Strand field.

Sespe Production Brought Closer to Oxnard

Standard Oil Co. of California moved Oxnard field production 1 mile closer to the city limits of the town of Oxnard in Ventura County with completion of 101-A Maulhardt Community. This well was originally drilled to 12,070 ft. and abandoned in January last year. Standard resumed operations in March of this year by cleaning out the hole and running formation tests. Standard used a nitrogen cushion in testing the intervals 6,615-90 ft., 7,178-7,235 ft., 7,365-7,440 ft., and 7,706-55 ft. For the completion it was selectively perforated between 6,613-82 ft. Its initial production was 800 bbl. daily of 26°-gravity crude flowing. The well has been shut in pending completion of tanks.

The depth and crude characteristics correspond with that of the Sespe formation McInnes zone wells located about 1 mile east.

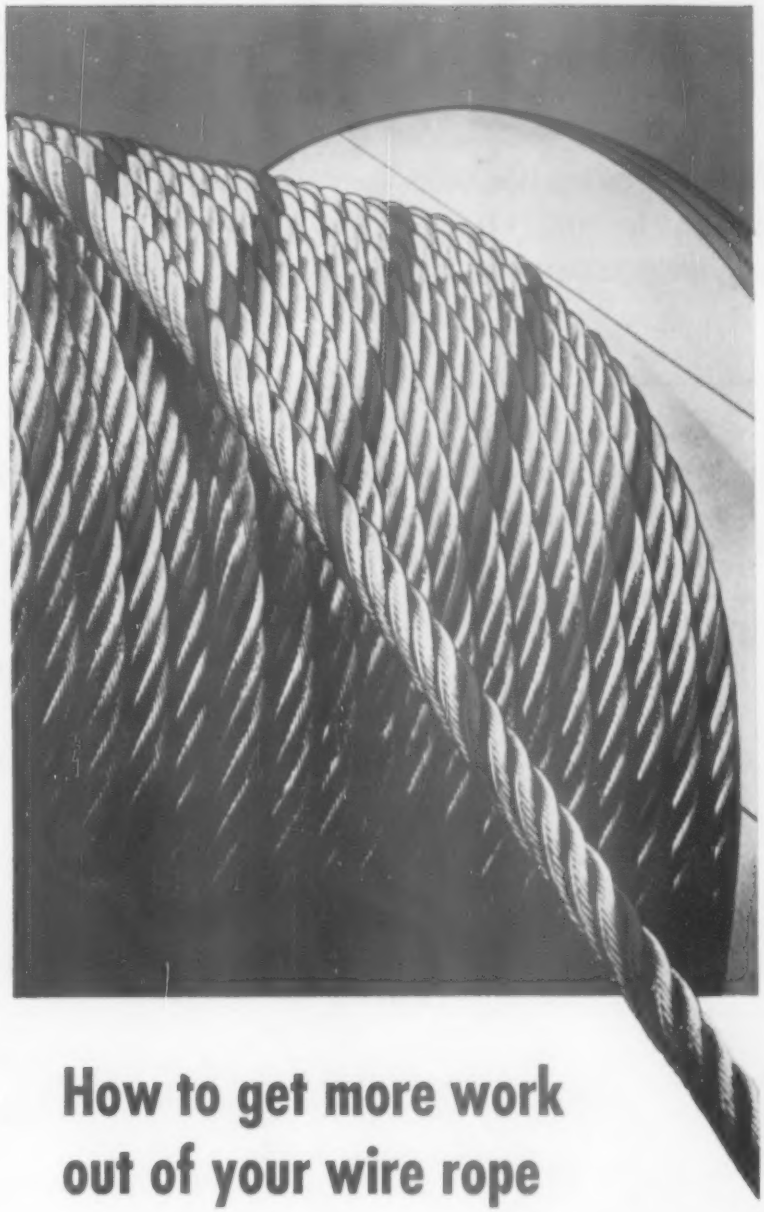
ROCKY MOUNTAIN

NORTH DAKOTA

New Field on Nesson Anticline Indicated

A new oil field is indicated for the area of the Nesson Anticline between Charlson and Sanish fields. The discovery prospect is Amerada Petroleum Corp. 1 Lacey-Norby in SE NE 1-152n-95w, McKenzie County.

Amerada recovered 800 ft. of free oil, 3,900 ft. of highly gas and oil-cut water cushion, 30 ft. of highly gas and oil-cut mud on a test of the Madison



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Deep-center Lifeguard steering wheel helps protect driver from steering post, in case of accident.

Double-grip Lifeguard door latches give added protection against doors flying open on impact.

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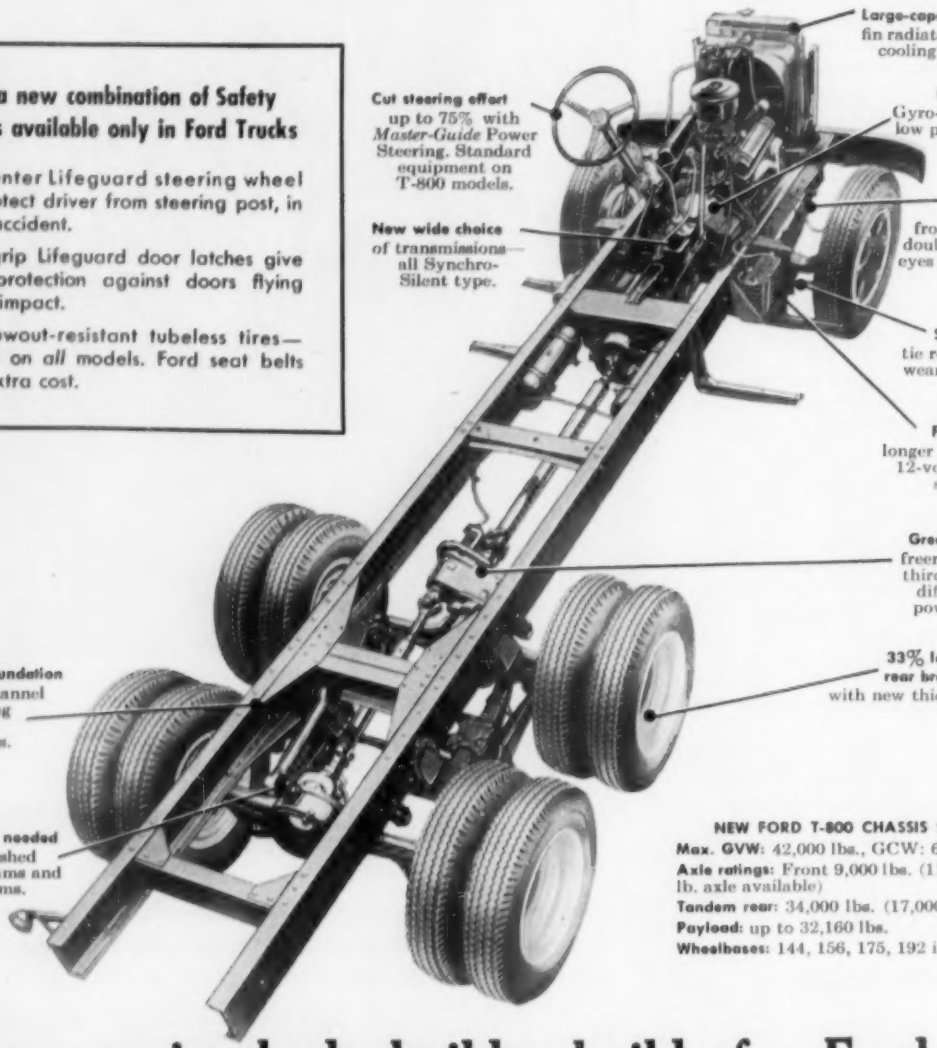

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Cut steering effort up to 75% with *Master-Guide* Power Steering. Standard equipment on T-800 models.

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Tandem rear: 34,000 lbs. (17,000 each axle)
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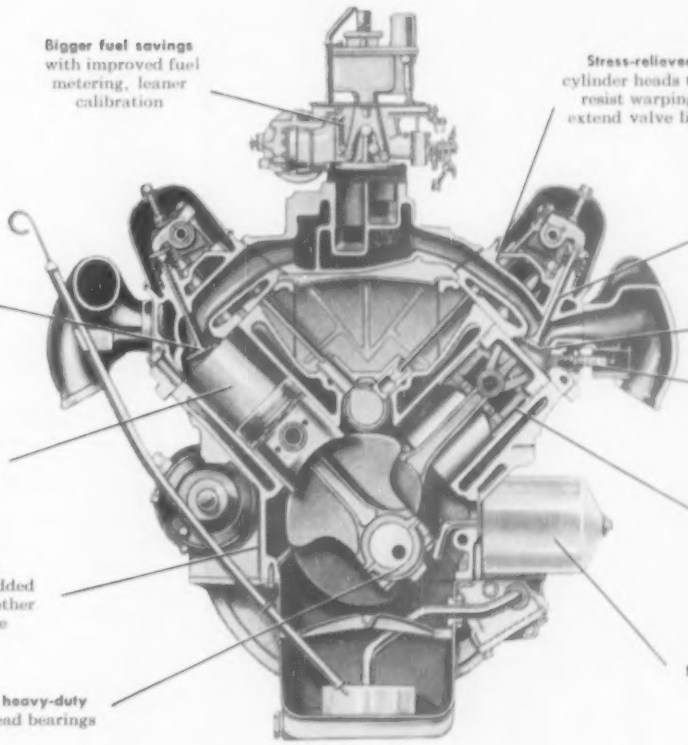

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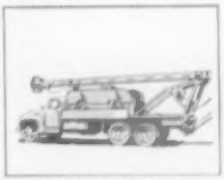
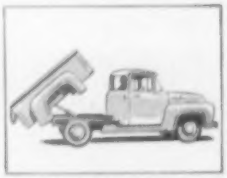


DRILLING TRUCK



LIGHT DUTY DUMP

at 8,533-8,767 ft. Previous tests also recovered oil. This new discovery prospect is about halfway between the two mentioned fields, separated from Charlson and Blue Buttes fields by dry holes.

NEBRASKA

Third New Pool for Year in Morrill County

Skelly Oil Co. opened the third new pool this year for the county at the 1 Lindberg in NW NW SW 11-17n-52w, Morrill County. The operator swabbed 338 bbl. of oil on an 11-hour test in the "J" sand topped at 5,212 ft. The daily swab rate is 700 bbl.

The confirmation test has been staked at 2 Lindberg in NW SE SW 11-17n-52w, an east offset try to the discovery. Location is 1½ miles northwest of Juelfs field, Cheyenne County.

NORTHWEST NEW MEXICO

Sunray Mid-Continent Oil Co. has two apparent new oil producers on a 5,100-acre block in the San Juan basin in northwestern New Mexico. The wells represent Sunray Mid-Continent's first oil prospecting efforts in the San Juan basin.

The 1 Federal "B" well, a ¾-mile extension of East Bisti field, flowed oil at the rate of 720 bbl. a day during the last 2 hours of an initial flow test. The test was concluded when all storage on the site was filled. Production is from the Gallup sand. Perforations were made from 4,760-80, 4,790-4,824; 4,832-41, 4,847-60 ft. Total depth of the hole is 4,915 ft. The well is located 660 ft. from the north and east lines of 17-25n-12w, in San Juan County.

The 1 Federal "C" well, 2 miles northwest of the "B" well and in West Bisti field, had a natural flow of oil at the rate of 288 bbl. a day during a 4-hour test following perforations at 4,828-56 ft. The producing formation is the Gallup sand. Casing pressure was 150 lb. and tubing pressure 25 lb. Gas-oil ratio was 300:1. Total depth of the hole is 5,003 ft. The well, a 40-acre offset to production in West Bisti field is located 660 ft. from the north and west lines of 6-25n-12w.

Sunray Mid-Continent has more than 5,000 additional acres in the area of play and has moved rigs onto nearby locations and is preparing now to drill the No. 2 and No. 3 wells on the Federal "C" lease.

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GREAT LAKES

MICHIGAN

Deepened an additional 4 ft. in Dundee-Monroe section, oil saturation was increased at the Miller Brothers 1 Siemion, NE SE SW 3-7n-15w, Robinson Township wildcat, Ottawa County. Fluid level was reported to have remained about constant, between swab tests, at 1,000 ft. at original depth, 2,106 ft. After hole was drilled to 2,110 ft., present depth, this level raised to 1,900 ft. Operators were installing a pumping unit for extensive testing but estimated that well appeared to be good for about 10 bbl. of oil daily on initial pump tests run with drilling machine.

This Dundee-Detroit River pay zone was commanding close attention of shallow district operators. It may herald a new pay zone and a new area for extensive development. The Miller Brothers were moving drilling tools to the direct north 10-acre offset—SE NE SW 3-7n-15w—which will be drilled to this pay objective immediately. Dundee top was tentatively picked at about 2,029 ft.

• The Leavitt Township Dundee oil-showing wildcat, Oceana County,

restricted analysis of the steel

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failed to pump oil to storage natural, and after a 100-gal. acid treatment, well pumped fluid at the rate of 3 bbl. of fluid an hour, 80 per cent water. Tests appeared to conclusively prove that water showing following acid treatment was coming from pay and bottom of hole. Deepening operations, with Reed City zone as next objective, were in progress.

This wildcat, McClure Oil Co. 1 Studabaker, NE NW NW 16-15n-15w, logged top of Dundee at 2,561 ft. Hole was drilled to 2,568 ft., total depth, with oil showing in the bottom foot penetrated. Well carried 550 ft. of free oil natural on a 40-hour fill-up test.

WESTERN CANADA

ALBERTA

Gas Discovery Completed In Pouce Coupe Region

The team of Pacific Petroleums, Ltd., Canadian Northern Oil & Gas Co., Ltd., Canadian Atlantic Oil Co., Ltd., has completed a gas discovery well in the Pouce Coupe area of northwestern Alberta with an indicated potential of about 6,000,000 cu. ft. daily. It is about 50 miles northwest of Grande Prairie, Alberta and 21 miles southeast of Dawson Creek, British Columbia.

The well, Canadian Northern-Pacific 6A South Pouce Coupe, is on LSD 10, 6-78-12w6. It lies 1 mile south of the Pacific 5 Pouce Coupe Cadotte zone gas success and 1¼ miles west of the Pacific 2 Pouce Coupe, another Cadotte zone gas producer.

This strike was made in the Cadomin zone and during drilling operations two drill-stem tests were run in the horizon, around the 5,250-ft. mark. At that time gas flows of up to 4,500,000 cu. ft. per day were encountered. The well was then carried to total depth 5,917 ft. and production casing was set to 5,916 ft. Crew then perforated the Cadomin formation in the interval 5,248-70 ft. with 8 shots per foot. A 2-week production test was carried out on the well and an absolute open flow potential of 5,900,000 cu. ft. per day was established. The well is currently shut in, pending a market outlet for its product.

SASKATCHEWAN

Woodbend Oil Recovered At Estevan Wildcat

Imperial Oil, Ltd. has reportedly recovered some oil along with fresh water and salt water during a drill-stem test in the Woodbend zone of the Devonian formation at its 15-7 Halkett exploratory venture in the Estevan area of southeast Saskatchewan. The oil show at this wildcat which is situated 5 miles north-northwest of Estevan town and 20 miles southeast of the Midale Mississippian oil field was the first of any kind in the Devonian at any well in the province, and because of that, is very significant. Nearly all of the oil discovered in the general region of the Halkett test has been found in the Mississippian limestone and therefore most of the wells in that region have tested to that zone only with comparatively few ventures being carried to the deeper horizons.

This show was encountered at the 15-7 well on LSD 15, 7-3-8w2, and it is understood a drill-stem test was run of the interval 7,019 to 7,039 ft. Exact details of the test haven't been released by reliable reports give the recovery as 300 ft. of oil cut fresh water, 90 ft. of heavily oil-cut mud, 150 ft. of oily water, 60 ft. of muddy oily watery froth (55 per cent oil) and 30 ft. of oil-cut muddy salt water.

Crew on this hole is carrying out further test in the Devonian to determine its commercial worth.

MANITOBA

Souris Valley Oil Co., Ltd., announces the successful completion of the second well on the Wardle half section in Daly field west of Virden, Man-

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itoba. This well, Souris Valley-Pascar 6-24 Wardle, was producing 96 bbl. per day at the end of the 5-day production test.

Total depth was 2,498 ft. with production casing set to this depth. The well was perforated over an interval of 4 ft. in the lowermost producing zone. Core analysis indicate two producing zones above the interval perforated. A third well on this lease is nearing completion.

A hookup has been made to the Trans Prairie Pipeline gathering system which enables Souris to ship oil during the road ban period.

Successful Wildcats

SASKATCHEWAN

Mobil-Woodley Southern 27-4 Verlo, LSD 4, 27-16-19w3. TD 3,450 ft., Roseray oil well.

NORTHWEST NEW MEXICO

San Juan County: Humble Oil & Refining Co. 1-B Navajo, C NW SW 29-32n-20w. IPF 424 BFPD (369 BO, 55 BWPD). Paradox discovery, new field on southeastern rim of Paradox basin. TD 6,850 ft. Madison.

COLORADO

Morgan County: F. Landauer & Associates 1 "A" Rocchio, NW NW NE 9-4n-60w. IPP 60 BOPD, "J" sand discovery, new field. TD 6,342 ft. "J" sand.

WYOMING

Park County: Stanolind Oil & Gas Co. 1 Government, SE NW SE 31-57n-98w. IPP 311 BO 21 hours test of Tensleep. New pay discovery. TD 7,381 ft.

TEXAS PANHANDLE

Hansford County: Sun Oil Co. 2 Coy Holt, 10 miles W of Spearman, ¾ mile NE of the 1 Holt discovery well, 1 mile N of the 1 indicated gas discovery in south-central part of county. Sec. 140, Blk. 45, H&TC Sur. IPF 28,000 M.c.f. of gas per day, upper Morrow 7,053-67 ft. TD 7,496 ft. (Gas discovery.)

NORTH TEXAS

Wilbarger County: Texx-Tex Oil Co. 1 Williamson, 51-15-H&TC, 14 mi. NE Vernon. IPP 204 BOPD, 35°, GOR 200, pay 6,212-26 ft. TD 6,357 ft.

WEST CENTRAL TEXAS

Stonewall County: McLean & Tompkins 1-C Trammell, Wm. Vardeman Sur. 347, new pay in Tompkins field. IP 236 BOPD, 14/64-in., TP 150 psi., GOR 490, 41°, Canyon sand 4,930-43 ft. TD 6,135 ft.

Throckmorton County: McMahon-Bullington Drilling Co. 1 Roach, Sec. 2200, TE&L Sur., 6 mi. NW Elbert. IPP 45 BOPD, 37°, GOR 150, pay 3,562-67 ft. TD 4,620 ft.

WEST TEXAS

Coke County: Miami Operating Co., Inc., 1-A Havins, Sec. 7, Caldwell CSL Sur., 6 mi. S Robert Lee, 1¾ mi. NE Weaver Ranch-Strawn field. IP 43 BOPD, 22/64-in., TP 280 psi., GOR 1160, 48°, Strawn perforations 6,208-12 ft. TD 6,540 ft.

Ector County: Woodward & Co. 1 Sallie Ratliff, 48-42-T1S-T&P, 4 mi. NE Odessa, extension to Headlee field. IP 633 BOPD, ¾-in., TP 1750 psi., GOR 1880, 41°, top Devonian 12,015 ft., elev. 2,989 ft., perforated 12,280-370 ft. TD 13,777 ft.

Mitchell County: Duncan Drilling Co. 1 Turner-Gregory, 19-28-T1N-T&P, 5 mi. NW Westbrook. IPP 76 BOPD, 25°, GOR 315, pay 2,668-2,750 ft. TD 3,505 ft.

Upton County: Humble Oil & Refining Co. 2-D Rosa Barnett, 83-Y-GC&SF, 20 mi. NE McCamey, new pay in King Mountain-Ellenburger field. IP 398 BOPD, ¼-in., TP 1025 psi., GOR 1276, top Fusselman pay 10,658 ft., perforated 10,568-86 ft. TD 11,935 ft., elev. 3,096 ft.

Winkler County: Standard Oil Co. of Texas 1 Lovett, 14-B3-PSL Sur., 3 mi. N Kermit, dual discovery. IP 308 BOPD, 16/64-in., TP 500 psi., 41.8°, GOR 1045, Ellenburger 10,622-26 ft.; IP from Fusselman, calculated open flow 9,000 M.c.f., plus 34 bbl. condensate per 1,000 M.c.f., 63°. TD 10,645 ft., elev. 2,915 ft., top Fusselman 8,640 ft., Ellenburger 10,434 ft.

SOUTHEAST NEW MEXICO

Eddy County: Humble Oil & Refining Co. 1 Chalk Bluff Draw Unit, 5-18s-27e. IP calculated open flow 8,482 M.c.f., plus 41.5 bbl. 54° condensate per 1,000 M.c.f., ⅜-in. choke, TP 3,020 psi., GOR 209,000:1. Pennsylvanian Bend perforations 9,443-63. TD 10,404 ft.

Lea County: Continental Oil Co. 1-19 Russell-Federal, 19-26s-32e. IP 293 BOPD, ¼-in., TP 100 psi., GOR 368, 41.8°, Delaware sand 4,266-75 ft. TD 4,282 ft.

SOUTHWEST TEXAS

Atascosa County: Goldstein Oil Corp. 1 Moursund, Edward Estes Sur., A-222.

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OIL FIELD LUBRICANTS

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#505 & #506 — Especially blended, rich bodied gear oils that protect expensive mud pump bearings against failure due to excessive working pressures — heat — and acid corrosion — Two viscosities #505 (SAE 90) — #506 (SAE 140).

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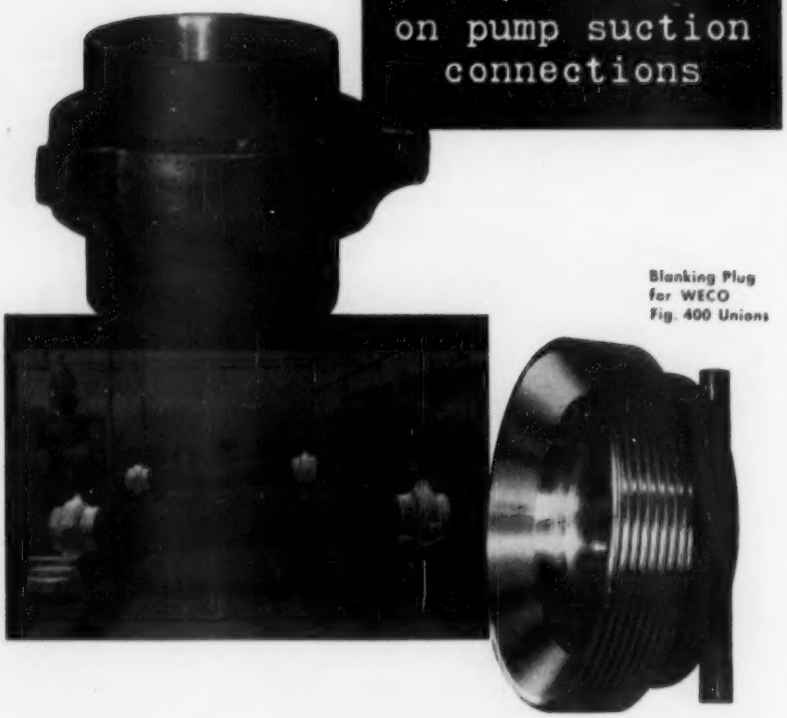

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Constant vibration of pump suction connections is a rough challenge to the seal-ability of a union. **WECO's** ball and cone seat is engineered to take such vibration as a matter of course and hold a positive, leak-proof seal. A few hammer blows quickly make-up or break the connection – and you can always be sure of a perfect seal every time the union is made-up.

When compounding pumps it takes but a few minutes to replace the **WECO** female sub with blanking plug – thus saving time and cost of installing blinds or valves in the line for this purpose.

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HOUSTON, TEXAS

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IPP 34.90 BOPD, 39°, perforations 4,920-38 ft. TD 4,950 ft. (New field—2 miles southwest of Jourdanton).

Starr County: W. D. Kennard 2-A Brock, Porcion 87. IP 62.30 BOPD, ⅛-in., 23°, perforations 2,282-84 ft. TD 2,315 ft. (New field).

TEXAS GULF COAST

Bee County: W. M. Bevly 1 Frels, John Ryan Sur., A-62 (2½ miles southeast of Beeville). IP 5.80 BOPD, ⅛-in., 50.4°, perforations 4,832-46 ft. (Yegua). TD 5,891 ft. (New field).

Colorado County: Lone Star Producing Co. 1-B Ackley, William W. Atwood Sur., A-60. IP 238.26 BOPD, ⅛-in., 45°, perforations 9,152-74 ft. TD 9,231 ft. (Extends, and new pay in Sheridan field).

Galveston County: Phillips Petroleum Co. 1-A Christensen, Pallas Love Sur., A-145. IP 52,000 M.c.f. daily, open-flow potential, GOR 11.2 M.c.f. per bbl., 50.5°, perforations 12,773-83 ft. TD 15,505 ft. (Extends Alta Loma field).

Placid Oil Co. et al 1 Cockrell et al Oil Unit 1, Lot 34, J. R. Pace Sur. IP 432 BOPD, 5/32-in., 36.6°, perforations 10,-935-45 ft. TD 11,059 ft. (New pay in Franks field).

Harris County: W. A. Moncrief 1 Wheelis-Powers Unit, Lot 14, Block D, Victor Blanco Sur., A-2. (Shut-in gas well—flowed 2,700 M.c.f. daily and 50 BCPD, ¼-in., prepotential test), perforations 9,050-85 ft. TD 9,133 ft. (1½ miles southwest of Alco-Mag field).

Matagorda County: Brazos Oil & Gas Co. 1 Otis et al Unit, Lot 19, Fred S. Robbins Ranch, J. T. Criswell Sur., A-20. IP 10,400 M.c.f. daily, open-flow potential, dry gas, perforations 4,088-4,103 ft. TD 4,167 ft. (New pay in Collegeport field).

SOUTH LOUISIANA

Plaquemines Parish: Shell Oil Co. 3 State Lease 2675, Block 21, South Pass area, Gulf of Mexico. IP 780 M.c.f. daily, ¼-in., dry gas, perforations 7,968-74 ft. TD 10,505 ft. (New pay in Block 30 field).

KENTUCKY

Henderson County: Slagter 1 P. Abell heirs, NW SW SW 24-O-22. IPP 19 BOPD, Cypress sand 2,244-54 ft., 30°. TD 2,702 ft. (Opens West Dixie pool in the Western Kentucky basin).

ILLINOIS

Franklin County: K. M. Bayer 2 Pearce, NE SW SW 1-5s-3e. IPP 50 BOPD, lower O'Hara lime 3,008-12 ft. TD 3,043 ft. (Opens East Ewing pool in the Illinois basin).

PENNSYLVANIA

Elk County: W. H. Wert 2 St. John, Benezette Quad., 13,500 ft. south of 41° 25', 8,000 ft. west of 78° 15'. IP 1,600 M.c.f. of gas per day, Oriskany sand. TD 6,194 ft. (New gas pool in Benezette field).

OKLAHOMA

Lincoln County: Beverly C. D. Edwards 1 Oberman, 1¼ miles south of North McCloud pool in NW NW SW 22-12n-2e. IPF 80 BOPD, Misener sand 5,526-33 ft., 44.5°, 10/64-in. choke, 2,640 M.c.f. of gas per day. TD 5,533 ft. (Oil discovery).

Osage County: T. N. Berry 1 Osage, 1½ miles southeast of Buffalo Head in NE NW NW 19-24n-4e. IPF 80 BOPD, Wilcox sand 3,710-23 ft., 46°, 20/64-in. choke. TD 3,723 ft. (Oil discovery on Northeast Oklahoma platform).

Arabian wildcat thrives on

"ONE-SOURCE" SERVICE

Wildcatting in distant places is always rugged work, but for one of National's customers operating in Dhofar, Arabia, the problems were unusually big. LST's and rafts had to beach thousands of tons of drilling equipment and other supplies from a freighter anchored off shore. A road had to be blasted over a 3,500-foot mountain range—monsoon-drenched and impassable all summer. Then sixty miles of desert to the drilling site, where it's 135 degrees in the afternoon. Yet the rig is up and drilling.

National Supply had the single responsibility of providing drilling equipment and all other supplies for this Arabian wildcat. We shipped one of our Type 80-B consolidated rigs and tons of drill pipe from Houston, along with trucks, jeeps, air-conditioned trailers, camp supplies, medicines, fuels—everything needed by crews located in the middle of a desert. To help insure efficiency in rigging-up, a National engineer traveled to and spent several days at the rig site.

Usually oil men have one of our 126 stores nearby where they can get everything from a can of paint to major equipment. Other times, as in Dhofar, we provide for their needs over long supply lines. In either case, operators know they can rely on the dependability of our one-source service, and the quality of our equipment.

THE NATIONAL SUPPLY COMPANY

You move mud at low cost

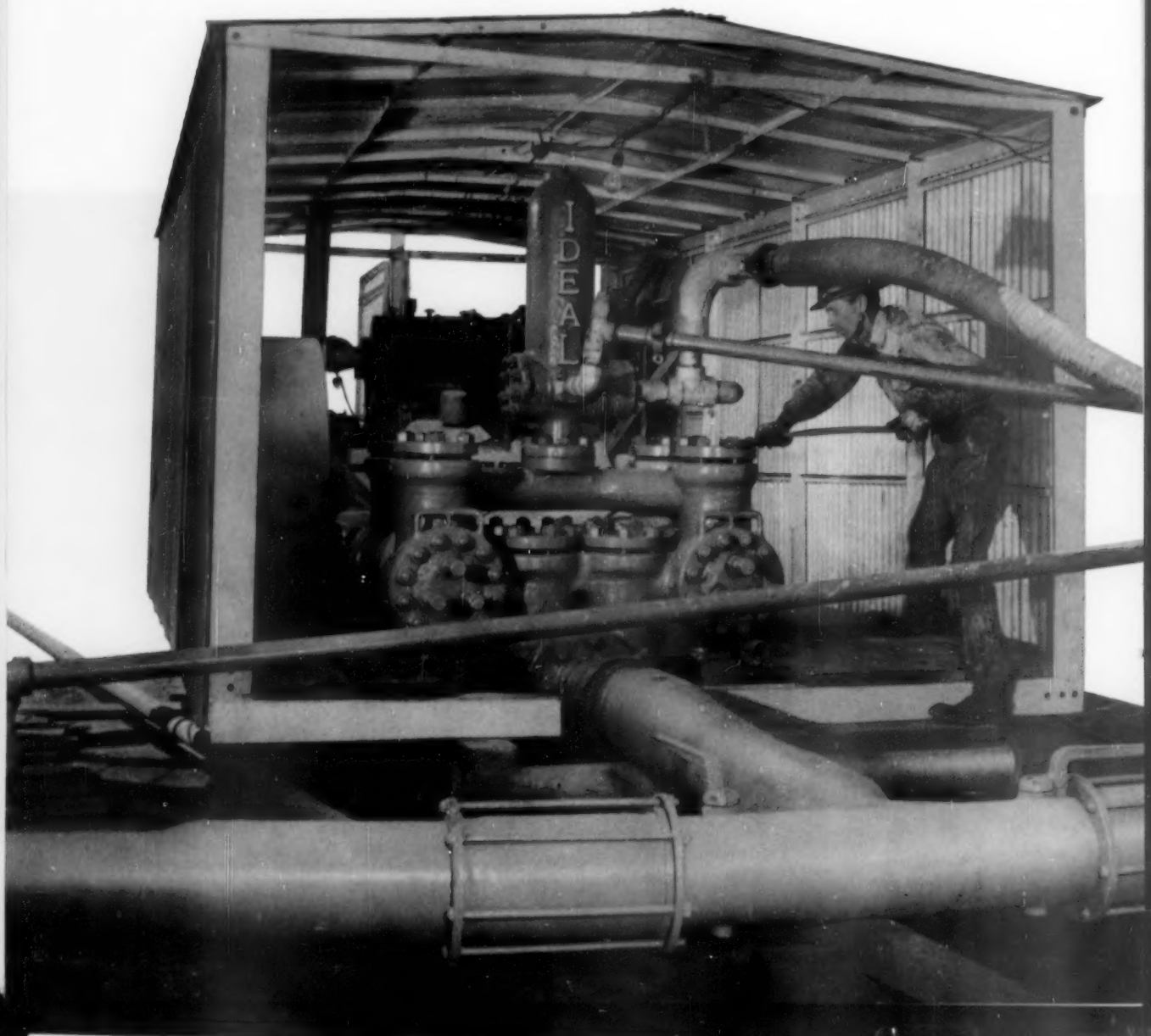
with IDEAL® Slush Pumps!

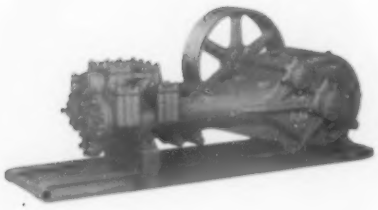
When you install the Ideal Slush Pumps that are right for your volume and pressure needs, you're well on the way to a low cost mud system. All Ideal pumps, ruggedly built for dependable service under a great variety of drilling conditions, have the mechanical and hydraulic features that insure sound action, easy maintenance and long life.

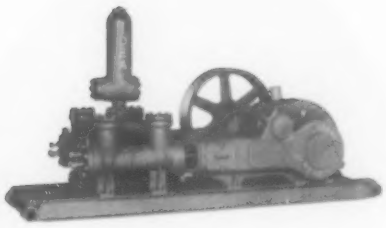
Their sturdy power ends include such features as pre-loaded main bearings,* mounted independent of the frame to reduce impact loading, hardened gears and completely enclosed, self-actuating lubrication systems. Their fluid ends—one-piece castings with no internal baffles—feature large, direct suction passages, smoothly curved for minimum resistance to fluid flow. Ideal Slush Pump frames are designed and built to insure a minimum amount of deflection, and all working parts are easily accessible.

All of these features, backed by National's 40 years of experience in mud pump design and construction, add up to top performance at minimum cost—wherever you put them to work. Check the chart on the next page, and ask the National representative in your area for more details on the Ideal Pumps that meet your needs best.

*Patented







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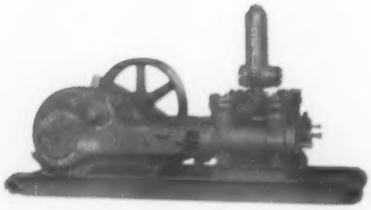
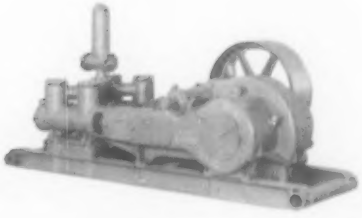
SLUSH PUMP

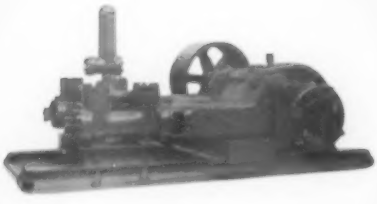
FOR EVERY

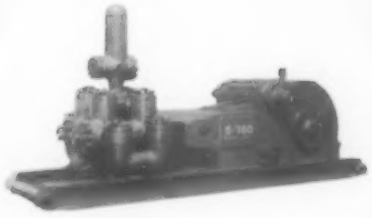
DRILLING NEED!

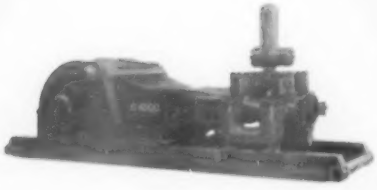




Type	Rated Max. Input H.P.	Rated Output H.P.	Rated Speed R.P.M.
D-50	80	68	75
C-100	150	128	75
C-150-B	220	187	70
C-250	370	315	65
C-350	600	510	60
G-700	700	595	70
G-1000	1000	850	65







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DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
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NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

See the next page for more information on lower pump costs ···➤

You keep pump maintenance low with IDEAL® Fluid End Parts

Whether you use them in Ideal Slush Pumps or pumps of other makes, you can count on Ideal Fluid End Parts to give long service life, reduce replacement costs and keep pumping efficiency high. For these reasons, precision-made Ideal Fluid End Parts have been important factors for many years in slush pump preventive maintenance programs throughout the world's oil fields.

You'll find these field-proven parts specially-packaged to insure factory-checked quality when you install them —look for their bright blue and yellow label next time you're in one of National's 126 stores . . . or ask the National representative in your area for the parts you need. Ideal Fluid End Parts are obtainable abroad through the Export Division of National Supply.

Gaskets and Packing—Selected for resiliency and resistance to the effects of chemicals or temperatures.

Liners—Hard, precision-finished working surface for long life, plus carefully-controlled outer dimensions insuring proper fit in pump cylinders.

Rods—Metallurgical control insures maximum resistance to abrasion, corrosion and wear.

Pistons—The type "GT" piston is made of a tough, resilient rubber, molded on a solid metal core to create a positive seal. The replaceable cup-type "Dual Seal" piston with API tapers is the latest addition to this Ideal family. Two cups at each end of the "Dual Seal" insure a positive, trouble-free seal.

Valves and Seats—Maximum opening for fluid flow assures complete filling at high speed.

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NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

New Kermac Position Is Filled

Personals

KERR-McGEE OIL INDUSTRIES, INC., a newcomer to the ranks of integrated companies, has created the position of administrative vice president to ease the growing pains common to rapid expansion.

To fill this position Kerr-McGee has chosen a man who got into the oil business by accident. He is L. A. Woodward, 48-year-old former president of Mid-West Refineries, Inc. He will do staff work for the company which, besides its integrated oil business, explores for and develops potash and uranium properties, processes uranium, and is a drilling contractor specializing increasingly in offshore operations.

Woodward didn't become connected with the oil business until 1944,, but he has been rising steadily since.

In joining Kermac at the Oklahoma City headquarters last month, Woodward returned to the part of the country where he was born. He is a native of Goodland, Kans., but grew up in Cedar Rapids, Iowa.

Oil career . . . Woodward was Detroit manager for an accounting firm which was servicing Mid-West Refineries when the opportunity came to enter the oil business.

Mid-West needed to bolster its executive staff. Woodward was picked as the man to do the job, and was named treasurer and assistant to the president. This was in 1944.

A year later he was vice president in charge of manufacturing, marketing, and finance, a position he held until being elected president early in 1950.

Woodward found his company in a hot competitive situation. Most of the revenue had to go into modernization to upgrade products and keep abreast of the quality race. But Mid-West was not alone. The predicament was shared by other small refiners.

Woodward soon came to the conclusion that if any one of them was to get off the treadmill, they would have to join forces. So he began 2 years of negoitations which culminated last fall in the merger of his company with Roosevelt Oil & Refining Corp. and Leonard Refineries, Inc.

Leonard, the surviving company, emerged in a much stronger position in the Michigan industry. The combined processing facilities totaled 31,500 bbl. daily in crude capacity and 7,900 bbl. of catalytic reforming, a much higher ratio of reforming to crude capacity than the industry average.

Integrated operations resulted in better utilization of the facilities of each refinery, wider product diversification, more efficient use of the pipeline system, and an opportunity to expand in petrochemicals.

Operating economies envisioned in the merger are already showing up on this year's balance sheet.

Woodward joins Kermac at a time when it is buying the 20,000-bbl. daily Cushing refinery of General American Oil Co. This is the latest in a series of deals which began last spring with the purchase of Deep Rock Oil Corp.'s refining, marketing, and transportation assets.

Education, family . . . Woodward earned a B.A. degree from Coe College, Cedar Rapids, in 1930, and an M.B.A. from Northwestern University.

He is a member of the American Petroleum Institute, a trustee of the National Petroleum Association, and a member of the distribution committee of the National Association of Manufacturers. He is a active worker in the Baptist church.

Woodward was married August 1, 1936, to Frances M. Danberg. They have two sons, Douglas, 12, and Russell, who will be 8 next month.

W. B. Strobel, projects development director in Continental Oil Co.'s petrochemical department, Houston, has been granted a 1956-57 Sloan Fellowship at Massachusetts Institute of Technology. Purpose of the Fellowships is to train promising young technical executives in broader phases of industrial management. Strobel is the fifth Conoco employe in 7 years to be so honored.

Ralph T. Hason has been promoted by Continental Oil Co. from staff member in the western region, Los Angeles, to assistant production manager in the southwestern region, Fort Worth. He replaces **S. V. McCollum,** recently transferred to Houston.

William H. Sloan has been promoted to superintendent of natural-gas liquids in Cities Service Oil Co.'s supply and distribution division. He had been assistant to the pipeline transportation manager since 1954. Sloan joined Cities Service in 1947 as special projects engineer in the natural-gasoline division.

H. M. Van Clief has been named superintendent of Honolulu Oil Corp.'s California division. He succeeds **H. S. Stark,** who retired recently after 33 years' service. **C. F. Meacham** was named to the new post of assistant superintendent.

L. E. J. Brouwer, former general managing director of Iranian Oil Exploration & Producing Co. and Iranian Oil Refining Co., on July 1 will become managing director of N. V. Koninklijke Nederlandsche Petroleum Mij. (Royal Dutch Petroleum Co.). He'll succeed **Dr. H. Bloemgarten,** managing director since 1948, who is retiring. Brouwer joined the Royal Dutch-Shell Group in 1931. He spent the next several years abroad with subsidiary firms and later returned to The Hague to head the parent company's G.E. logical and production departments. When the two Iranian companies were formed in 1954 by the International Consortium, Brouwer was named to manage them. In his new post he'll also be a managing director of the parent operating companies of the Royal Dutch-Shell Group.

George L. Parkhurst, vice president and a director of Standard Oil Co. of California, will be honored May 29 by the American Institute of Chemists' western chapter. He'll get the Honor Scroll, highest award an A.I.C. chapter can bestow. The award signifies Parkhurst's "outstanding integration of chemistry and administration in the petroleum petrochemical industries," and his "inspiration, guidance, and example of achievement to all chemists."

Personals

Rollin Eckis, vice president of Richfield Oil Corp. and exploration manager since 1954, has been elected executive vice president.

Eckis joined Richfield in 1937 as district geologist in Bakersfield, Calif. He was named assistant chief geologist in 1943, and became chief geologist in 1946. During the past 2 years he directed development of Richfield's exploration program in Canada, Alaska, Peru, Arabia, and Egypt.

W. H. Paulson has been named regional operations manager of Standard Oil Co. of California. He succeeds **C. G. Ward,** retiring after 36 years' service.

Dr. Robert E. Wilson, chairman of Standard Oil Co. (Ind.), has been named 1956 winner of engineering's foremost honor, the Washington award. The award is sponsored by five leading engineering societies and administered by the Western Society of Engineers. Wilson was selected for "his unusual dedication of leadership, through science and engineering, to advancement of research, industry, education, and public affairs.

Emmett H. Balch, Jr., has resigned as assistant district production superintendent for National Associated Petroleum Co. in Pawhuska, Okla., to join Toklan Oil Corp. as district engineer in Bartlesville, Okla.

LeRoy Culbertson, chief engineer of Phillips Petroleum Co.'s natural gasoline department since 1951, has been promoted to assistant manager. He succeeds **Roy M. Teel,** who resigned recently to become a consultant. Other promotions in the natural-gasoline department: **Louis P. Sumpter,** from operating division superintendent to director, engineering and construction division; **H. R. Markley,** from superintendent of plant operations to succeed Sumpter; **O. F. Grover,** from staff director of product correlation to the new post of services division director; **W. L. Phillips,** from western district superintendent to the new post of director, new plants and joint enterprises; and **R. C. Mason,** from assistant western district superintendent to succeed Phillips. All will be located in Phillips' Bartlesville, Okla., headquarters except Mason, who will remain in Odessa.

Glenn W. Poorman, former general manager of Esso Standard Oil Co.'s supply department and a director since 1954, has been elected a vice president. Poorman joined Esso in 1932 as chemical engineer in the Baton Rouge refinery. He'll continue as contact director for the firm's supply and transportation groups.

M. P. L. Love has been elected manufacturing vice president of Shell Oil Co. He succeeds **F. S. Clulow,** retiring in midyear after nearly 36 years with Shell. Love managed the firm's Houston refinery from 1951 to 1954 and has been on special assignment since. Clulow had held the manufacturing post since 1954.

George S. Kukuchek, Shell Oil Co. division mechanical engineer, has been shifted from Salt Lake City to New Orleans. Other Shell changes: **Robert J. Doubek,** junior mechancal engineer, from Los Angeles to Denver; and **Donald R. Lindsay,** development engineer, from Ventura, Calif., to Los Angeles.

J. K. NEWMAN

James Kenneth Newman has been named operations superintendent of British Malayan Petroleum Co.'s Seria field, Brunei, British Borneo. Newman has been with the Shell Group since 1949, most recently as manager of Northern Sarawak division, in Borneo, including the Lutong refinery. He succeeds **Guy Tunstall Notley,** who returns to London for a post with the Shell Group's headquarters.

Herman H. Kaveler, Tulsa consulting engineer, has opened a new office in Calgary. **Gordon Humphries** will be resident engineer in charge.

Ralph Ross, Canadian Oil Co., has been elected 1956 president of the Canadian Society of Exploration Geophysicists. Other new offiers: **J. G. Blundun,** Home Oil Co., Ltd., vice president; and **F. A. Hale,** California Standard Co., secretary.

Max Levin, district geologist for Continental Co. in Midland, Tex., since 1953, has resigned to join Ashmun & Hilliard there.

James H. Gardner, Jr., has resigned from L. B. Jackson Drilling Co., Tulsa, to join Garvey Drilling Co. as contract representative in Wichita.

Ray F. Granlund, sales vice president of Eastern States Petroleum Co., has been named vice president in charge of the refining department, petrochemical and chemical sales, and traffic. **Marvin A. Bomar,** general manager of refineries, was named a vice president. Granlund joined Eastern States in 1949 after many years as vice president of McMurrey Refining Co. Bomar joined the firm in 1936 as a mechanical helper.

Paul J. Griffiths, production engineer for Creole Petroleum Corp. since 1953, has been named vice president and general manager of White Eagle International Oil Co. in Havana. Before joining Creole, Griffiths was with Gulf Research & Development Co. and Mene Grande Oil Co., C.A.

Don R. Boydston, general manager of Lake Shore Pipe Line Co., Ashtabula, Ohio, has been elected vice president.

D. N. Stewart has been promoted by Humble Oil & Refining Co. from supervising petroleum engineer to assistant division petroleum engineer in the southwest Texas division. Other changes in Humble's production department: **E. B. Woodell,** from superintendent of the Jourdanton gas plant to assistant district superintendent, Flour Bluff district; **N. M. Kunkle,** from mechanical superintendent in the Katy gas cycling plant to succeed Woodell at Jourdanton; **F. W. Stover,** from superintendent of the Clear Lake gas plant, Gulf Coast division, to the Tomball district as assistant district superintendent; **J. P. Carroll,** from compressor plant foreman, Stratton district, to replace Stover at Clear Lake; **N. C. Galloway,** from cycling operator at Katy to compressor foreman, Stratton district; **H. D. McClain,** from assistant cycling plant superintendent at Katy to assistant district superintendent, Tomball district; and **C. O. McGee,** promoted from petroleum engineer to senior petroleum engineer in the southwest Texas division.

George F. Getty, II, newly elected director of Tidewater Oil Co., has been named vice president and general manager of the firm's eastern division, New York. He'll also be chairman of the eastern division operating committee. Getty was recently executive vice president and director of Getty Oil Co., formerly Pacific Western Oil Corp. He was also a director of Skelly Oil Co.

Canadians Form Counterpart of A.I.M.E. Oil Section

The Canadian Institute of Mining & Metallurgy and the American Institute of Mining, Metallurgical and Petroleum Engineers have formed a Canadian technical group comparable to A.I.M.E.'s Petroleum and Natural Gas Sections. To be known as the C.I.M.-A.I.M.E. Petroleum Engineering Section of C.I.M.'s Petroleum & Natural Gas Division, the new group's aim will be to apply "academic and practical engineering principles" to oil and gas exploration. It will meet monthly. Officers and directors of the section are, front, left to right: E. K. Schluntz, Shell Oil Co.; J. B. Maughan, Standard Oil & Gas Co.; and J. A. Strand, Canadian Gulf Oil Co. Rear, left to right, are: J. B. Spalding, Otis Pressure Control Export, Inc.; R. Pot, Colorado Oil & Gas Co.; and G. S. Murray, Imperial Oil, Ltd. Not shown is Cliff J. Taylor, Baker Trans World, Inc.

Personals

Lloyd G. Smith has retired as vice president and director of Creole Petroleum Corp. after 43 years in the oil industry. Smith began as a draftsman in the Standard Oil Co. (Ind.), Whiting refinery. After a number of refining posts, he transferred in 1927 to Pan American Petroleum & Transport Co., New York, as assistant manufacturing manager. When Standard Oil Co. (N. J.) bought Pan American's foreign properties in 1932, Smith became assistant in charge of operations at Aruba and Tampico. He transferred to Creole in 1947.

Norman Giedt, Gulf Oil Corp. geologist, has been transferred from Bismarck, N. D., to Casper, Wyo.

Eric Thompson, Stanolind Oil & Gas Co. geologist, has been transferred from Bismarck, N. D., to Billings, Mont.

Rex Brown, Sun Oil Co., has been elected president of the Dakota Petroleum Club, Bismarck, N. D. Others elected: **Robert Anderson,** Carter Oil Co., vice president; **Steve Harris,** Harris & Brown, secretary; and **Tom Levi,** Northwest Mapping Co., treasurer. **Andy Masson,** Skelly Oil Co., and **George Summers,** independent, were named new directors.

James H. Drewelson, Cities Service Oil Co. geologist, has been transferred from Albuquerque to Bartlesville, Okla.

R. L. Shingler, Jr., has resigned as mining supervisor with Surplus Uranium Co., Inc., Monticello, Utah, to join Apache Drilling Co., Albuquerque, as field superintendent.

John M. Clark, Stanolind Oil & Gas Co. field engineer, has been transferred from Farmington to Hobbs, N. M.

Seth Lobdell, Sun Oil Co. geologist, has been transferred from Amarillo to Dallas.

Robert F. Harwick, former Gulf Coast regional manager of the Du Pont petroleum chemicals division, has been named manager of the division's western region. **George L. Tyler** becomes assistant manager. Other changes in Du Pont's petrochemicals branch: **William B. Gest,** named manager of the newly formed Cleveland district; **Edison D. Jeffus,** named additives manager in the Gulf Coast region, Houston; and **William W. Wingate,** named Mid-Continent region additives manager, Tulsa.

DEATHS

John D. McNutt, who retired in 1947 as manager of Pure Oil Co.'s southwestern producing division, died May 6 in Tulsa. McNutt entered the industry about 1910 as an engineer with Ohio Fuel Gas Co. In 1913 he joined Ohio Cities Gas Co., predecessor of Pure. Later he managed the firm's Kentucky division, and from 1922 to 1931 was assistant production manager in Chicago.

Levi Juliah Burd, 78, Browning, Mont., independent, died last week. He had been active in promoting the oil industry in Glacier County, Montana, and managed the Levi Burd Oil Trustee Interests in association with a son-in-law, B. P. McNair.

Thomas Hugh McCay, 62, pioneer in production near Bakersfield, Calif., died there recently.

J. M. Lilligren, who retired recently as geologist for Sinclair Oil & Gas Co. in Billings, Mont., died April 22 in Guadalajara, Mexico. He had been with Sinclair since the early 1920's.

Rex Cheek, 35, petroleum engineer with the Washington division of Ball Associates, petroleum consultants, died recently in Washington. Before joining Ball 4 years ago, Cheek was with Stanolind Oil & Gas Co.'s central division.

Dr. M. M. (Mo) Slotnick, 55, geophysical consultant to Standard-Vacuum Oil Co., died May 7 while boarding a plane in Dallas. Slotnick joined Humble Oil & Refining Co. in 1930 and was chief mathematician in its exploration department 18 years before going to Stanvac in 1954.

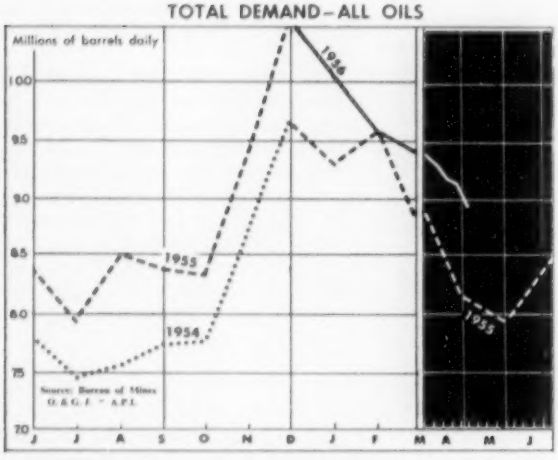
Lindsey E. Thrush, 44, foreman for Richfield Oil Corp. in New Cuyama, Calif., died April 25 after an auto accident.

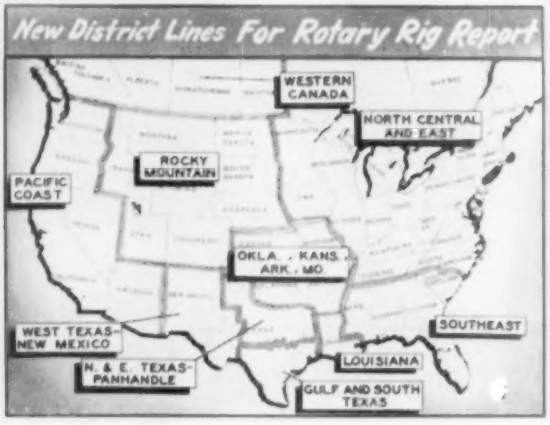
Carl Guin, 69, prominent Abilene, Tex., independent, died there April 27.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,092,245	DOWN	70,355	UP	401,715
Crude stocks	273,522,000	UP	2,814,000	DOWN	1,454,000
Completions	1,072	DOWN	71	DOWN	11
Refinery runs	7,676,000	UP	179,000	UP	597,000
Gasoline stocks	189,220,000	DOWN	968,000	UP	14,977,000
Kerosine stocks	18,349,000	UP	455,000	DOWN	3,846,000
Distillate stocks	63,990,000	UP	2,067,000	DOWN	6,561,000
Residual stocks	33,216,000	UP	740,000	DOWN	10,089,000
Four-product stocks	304,775,000	UP	2,294,000	DOWN	5,519,000
Total imports	1,327,200	UP	186,400	UP	175,500





Gasoline Prices and Quality Improve; Summer Programs for Distillate Start

GASOLINE markets are very firm in most areas despite the increase in gasoline stocks of 16,000,000 bbl. over last year.

Socony Mobil Oil Co. raised gasoline tank-wagon prices in New York and New England, effective May 8. The increase averaged about 0.6 cent a gallon. Temporary reductions and allowables in price-war areas were revoked.

Cities Service Oil Co. established minimum retail prices for gasoline in New Jersey under the state's fair-trade law.

Standard Oil Co. (Ind.) has raised tank-wagon prices for gasoline in much of its marketing area and at the same time has made available higher-octane fuels.

Only part of the shippers in the Great Lakes line have raised gasoline prices. Others are waiting until the new gasoline is available at terminals to which they ship most of their products.

Esso Standard Oil Co. started summer price protection for resellers of light heating oils on May 9, but with no allowance off posted prices. Billing will be deferred until October 1 for resellers and consumers, but no price protection was mentioned for home owners. Diesel fuel is not included.

Change in rotary-rig report . . . The table of active rotary rigs on page 316 has been changed. Hughes Tool Co. made some shifts in company districts and decided to release active rig information on a state basis.

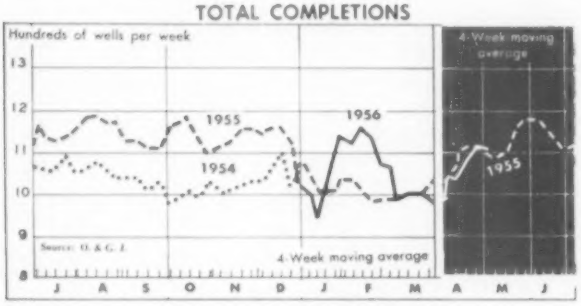
Lack of space prevents a complete tabulation of all state information from the report, so state totals have been accumulated into areas. The accompanying map of the United States shows district lines and states included in each area.

The division lines for the breakdown of Texas are described below. The line cutting off West Texas runs north or east of the following counties: Bailey, Lamb, Hale, Floyd, Crosby, Garza, Scurry, Mitchell, Sterling, Reagan, Crockett, and Terrell.

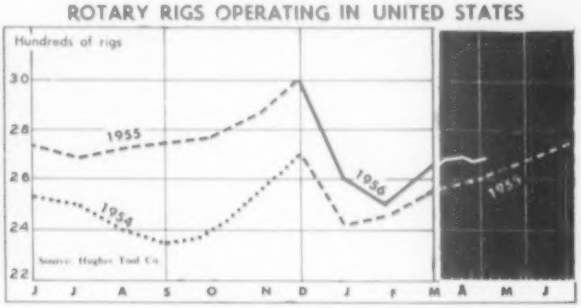
The large district which covers Texas Gulf Coast and South Texas includes the following counties and all counties to the south: Val Verde, Edwards, Kerr, Kendall, Blanco, Burnett, Williamson, Milan, Brazos, Madison, Walker, San Jacinto, Polk, Tyler, Jasper, and Newton.

Data for last week and the corresponding week of last year are on the new basis. Except for the combination of West Texas and New Mexico, all areas will follow state lines.

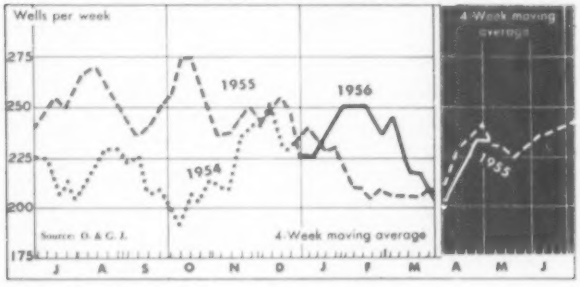
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	5-7-56	4-30-56	5-9-55
North Central and East	121	108	175
Southeast	29	32	38
Okla., Kans., Ark., Mo.	484	487	552
Louisiana	443	489	396
N. and E. Texas-Panhandle	440	444	404
Gulf and South Texas	255	204	232
West Texas-New Mexico	546	534	531
Rocky Mountain	241	238	230
Pacific Coast	130	135	147
Total United States	2,689	2,671	2,705
Western Canada	137	96	77

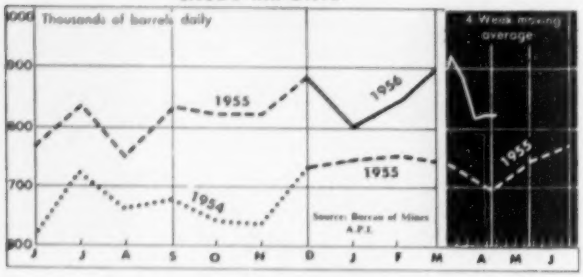
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 5, 1956

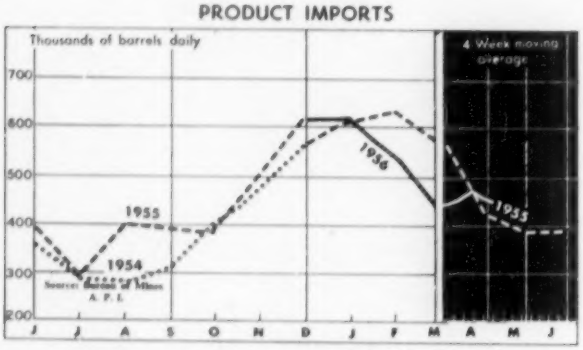
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1956	Cum. 1955	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1956: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	1	0	0	11,546	33	37	0	0	0	0	0	0	0	1	17	18
Arkansas	15	9	0	6	44,314	260	232	1	0	0	2	3	13	0	2	40	55
California	36	27	1	8	173,199	732	892	0	0	0	7	7	14	0	0	149	163
Colorado	31	9	4	18	162,041	392	460	0	0	0	10	10	6	0	6	175	187
Illinois	82	36	0	46	189,766	1,176	1,226	2	0	0	19	21	19	0	0	196	215
Indiana	13	6	0	7	22,949	205	252	0	0	0	1	1	6	0	1	40	47
Kansas	99	47	6	*46	337,170	1,723	1,738	3	0	0	16	19	42	1	10	296	349
Kentucky	40	21	4	15	53,986	567	422	1	0	0	5	6	10	0	0	123	133
Louisiana	59	34	5	20	331,229	1,286	1,290	1	0	1	5	7	37	26	12	165	240
North	29	16	2	11	119,809	495	671	1	0	0	1	2	10	1	1	59	71
South	24	15	2	7	168,443	632	619	0	0	0	4	4	24	23	5	94	146
Offshore	6	3	1	2	42,977	159		0	0	1	0	1	3	2	6	12	23
Michigan	5	3	1	1	17,497	157	178	0	0	0	0	0	3	0	0	50	53
Mississippi	11	4	0	7	82,284	151	166	0	0	0	3	3	4	0	1	59	64
Montana	8	6	0	2	51,617	111	103	0	0	0	1	1	5	0	0	27	32
Nebraska	15	4	0	11	87,392	322	205	0	0	0	6	6	14	0	0	153	167
New Mexico	31	15	9	7	139,817	614	469	2	0	0	4	6	17	0	5	50	72
Northwest	9	1	7	1	40,303	217	120	0	0	0	0	0	1	0	5	14	20
Southeast	22	14	2	6	99,514	397	349	2	0	0	4	6	16	0	0	36	52
North Dakota	7	5	0	2	53,389	80	75	0	0	0	0	0	5	0	0	15	20
Ohio	17	8	3	6	48,562	363	363	0	0	0	0	0	0	0	1	3	4
Oklahoma	176	114	6	156	659,536	3,027	2,981	2	1	0	13	16	45	12	10	249	316
Pennsylvania-New York	8	0	6	2	46,552	311	516	0	0	2	0	2	0	0	3	2	5
Texas	397	255	8	134	1,697,391	7,391	6,725	12	0	3	84	99	280	20	62	1,593	1,955
Southwest (1 & 4)	55	39	0	16	198,403	1,089	1,078	2	0	0	12	14	54	5	21	308	388
Gulf Coast (2 & 3)	61	25	7	29	423,604	945	895	3	0	3	15	21	26	8	25	244	303
East (5 & 6)	24	5	0	19	87,356	379	333	0	0	0	15	15	4	1	4	143	152
North Central (7-B & 9)	140	91	0	49	420,055	2,602	2,368	2	0	0	26	28	122	0	2	609	733
West (7-C & 8)	95	79	0	16	482,590	1,984	1,705	5	0	0	15	20	73	0	6	267	346
Panhandle (10)	22	16	1	5	85,383	392	346	0	0	0	1	1	1	6	4	22	33
Utah	3	1	1	1	17,174	30	25	0	0	0	1	1	1	0	1	18	20
West Virginia	6	1	5	0	15,760	232	203	0	0	0	0	0	0	0	2	4	6
Wyoming	11	9	0	2	55,675	247	271	0	0	0	1	1	5	0	4	65	74
Miscellaneous (Idaho)	1	0	0	1	4,017	52	15	0	0	0	1	1	4	0	0	39	43
Total United States	**1,072**	615	59	398	4,302,863	19,462	18,844	24	1	6	179	**210**	530	59	121	3,528	4,238
Total previous week	1,143	621	66	456	4,474,824			29	4	6	203	242	506	58	115	3,349	4,028
Total May 7, 1955	1,083	640	55	388	4,086,691			26	3	3	175	207	528	80	120	3,223	3,951
Cumulative 1956	19,462	10,804	1,258	7,400	79,959,632												
Western Canada	16	8	1	7	91,180	803											

Service wells included *2, 113.

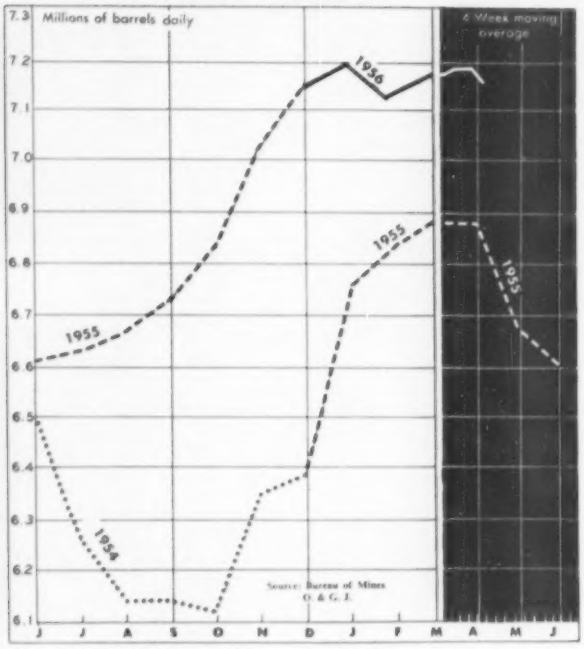
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

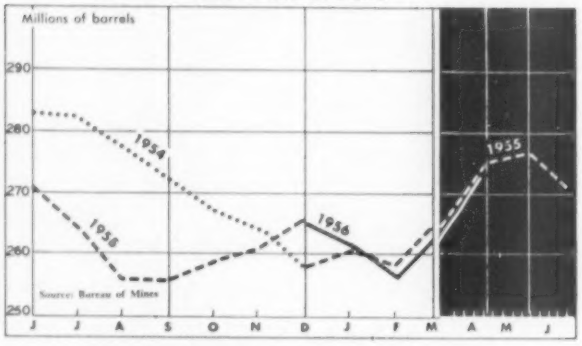


DAILY AVERAGE PRODUCTION FOR WEEK

	May 5 Crude oil	May 5 Lease condensate	May 5 Total	April 28 total
Alabama	4,600		4,600	4,800
Arkansas	72,600	550	73,150	73,050
California	966,400		966,400	965,200
Colorado	168,400		168,400	167,400
Eastern	48,800		48,800	48,000
Florida	1,375		1,375	1,325
Illinois	231,000		231,100	226,800
Indiana	31,800		31,800	32,000
Kansas	328,400		328,400	332,200
Kentucky	48,800		48,800	48,400
Louisiana	743,425	60,500	803,925	829,800
North	121,700	2,500	124,200	122,800
South	621,725	58,000	679,725	707,000
Michigan	28,400		28,400	27,100
Mississippi	107,175	3,700	110,875	111,800
Montana	51,300		51,300	52,500
Nebraska	35,800		35,800	37,400
New Mexico	244,755	3,200	247,955	253,300
North Dakota	29,700		29,700	31,900
Oklahoma	596,200		596,200	596,900
Texas	2,948,950	51,215	3,000,165	3,035,025
Dist. 1	54,675	425	55,100	54,950
Dist. 2	150,425	8,175	158,600	159,500
Dist. 3	427,125	25,000	452,125	454,500
Dist. 4	238,850	4,900	243,750	249,000
Dist. 5	45,000	450	45,450	45,475
Dist. 6	123,575	5,850	129,425	131,600
East Texas field	211,850		211,850	215,000
Dist. 7-B	155,850	50	155,900	161,050
Dist. 7-C	186,725	4,005	190,730	193,400
Dist. 8	1,049,725	1,800	1,051,525	1,061,875
Dist. 9	210,725	400	211,125	213,500
Dist. 10	94,425	160	94,585	95,175
Utah	5,200		5,200	5,100
Wyoming	279,600		279,600	282,300
Others	‡300		‡300	300
Total U. S.	6,973,080	119,165	**7,092,245**	7,162,600
Change from previous week, down			**70,355**	
Canada	†360,100		†360,100	†416,200
Total U. S. production January 1-May 5			897,111,145 bbl.	
Same period last year (crude plus cond.)			*854,412,240 bbl.	

*Includes 14,400,250 bbl. condensate. †Week ended previous Monday. ‡Nevada 200, South Dakota 100.

CRUDE-OIL STOCKS



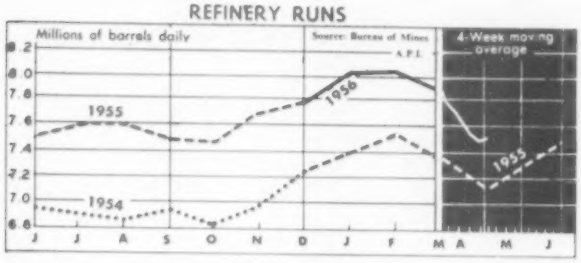
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

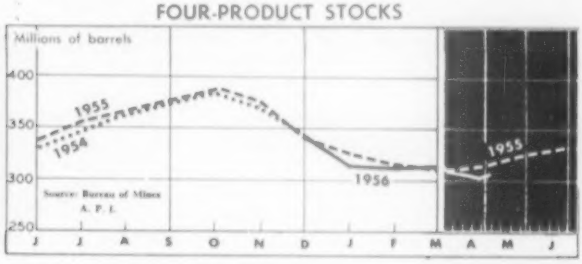
	4-28-56	4-21-56	4-30-55
Pennsylvania Grade	2,664	2,644	2,812
Other Appalachian	2,293	2,378	2,011
Illinois, Indiana, Michigan	9,790	10,006	11,591
Nebraska, North Dakota	2,214	2,050	2,375
Kansas	8,808	8,374	8,416
Oklahoma	25,614	24,860	25,171
Arkansas	3,033	2,689	2,914
Louisiana	16,488	17,431	15,450
North	2,584	2,557	2,482
South	13,904	14,874	12,968
Mississippi	3,029	3,032	2,869
New Mexico	8,120	8,050	8,901
Texas	127,751	126,202	127,569
East Texas proper	9,608	8,964	10,597
West Texas	63,243	63,526	56,227
Texas Gulf	22,403	21,880	25,179
Other Texas	32,497	31,832	35,566
Wyoming	16,874	16,511	15,351
Other Rocky Mountain	5,856	6,056	5,467
California	28,331	28,200	32,268
Foreign	12,657	12,225	11,811
Total	273,522	270,708	274,976

*Bureau of Mines. Includes 2,304,000 bbl. in California.

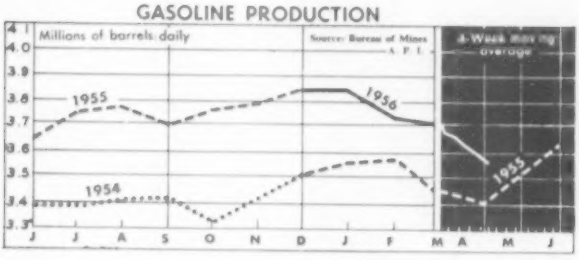
REFINERY RUNS



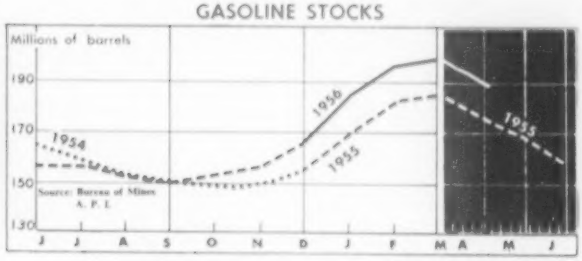
FOUR-PRODUCT STOCKS



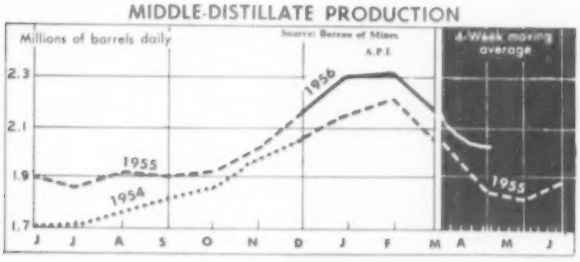
GASOLINE PRODUCTION



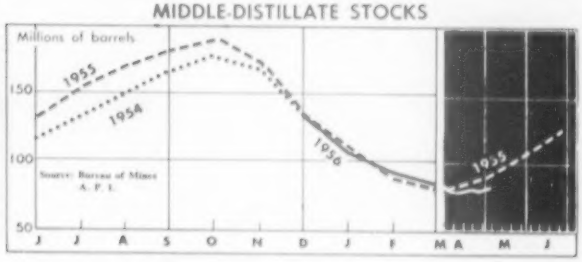
GASOLINE STOCKS



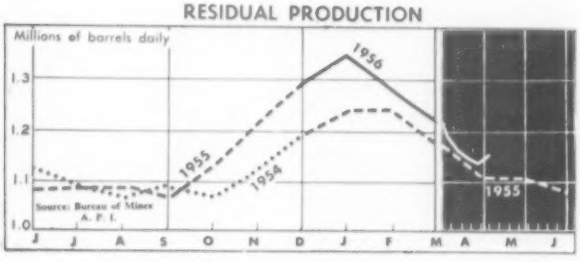
MIDDLE-DISTILLATE PRODUCTION



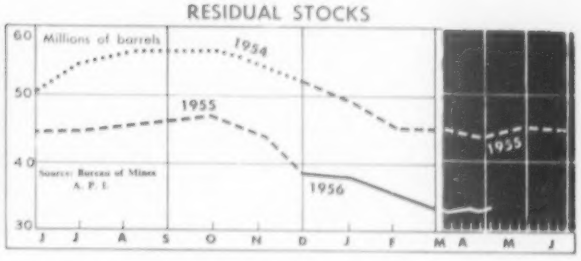
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, MAY 4

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks† Gaso.‡	Kero.	Dist.	Resid.	Bureau of Mines, May 1955 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,053	427.0	40.4	278.8	214.3	40,337	6,870	18,145	7,524	1,003	390.2	31.0	233.2	179.5
Appalachian:														
District 1	90	32.6	3.4	23.9	9.1	4,640	385	1,229	322	82	34.3	2.1	18.0	3.5
District 2	105	49.0	7.1	13.9	17.3	3,148	429	526	207	98	52.6	3.0	13.7	11.2
Ind., Ill., Ky.	1,356	604.0	77.3	273.7	187.0	39,803	3,553	10,435	3,816	1,345	678.0	66.7	243.1	158.7
Okla., Kans., Mo.	609	336.1	10.0	160.3	18.3	20,492	805	6,748	1,057	642	352.0	16.1	150.8	33.5
Inland Texas	262	190.6	13.3	48.4	25.4	6,816	388	1,427	1,392	251	190.0	8.4	47.8	22.9
Texas Gulf Coast	2,057	938.0	99.6	522.1	248.8	26,499	2,810	9,246	5,466	1,804	851.9	104.1	405.0	254.4
La. Gulf Coast	667	345.1	60.9	159.9	56.3	10,267	2,112	4,724	1,577	626	328.0	49.1	171.5	49.5
N. La. and Ark.	38	18.3		13.9	3.0	4,337	398	957	41	95	33.5	7.1	23.7	5.1
Rocky Mountain:														
New Mexico	23	11.9		4.0	2.9	335	3	92	36	21	10.0	0.3	3.6	2.8
Other Rocky Mtn.	271	124.1	3.7	60.3	32.0	7,732	248	2,048	779	235	106.5	2.0	57.8	35.1
California	1,095	455.4	9.4	152.1	347.7	24,814	348	8,413	10,999	1,066	480.9	5.7	151.0	354.3
May 4, 1956	7,626	3,532.1	325.1	1,711.3	1,162.1	189,220	18,349	63,990	33,216	7,268	3,507.9	295.6	1,519.2	1,110.5
April 27, 1956	7,447	3,557.7	315.0	1,695.3	1,122.6	190,188	17,894	61,923	32,476					
May 6, 1955	7,029	3,422.7	296.4	1,472.4	1,075.7	174,243	22,195	70,551	43,305					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-oil and refinery prices at representative U. S. and foreign points

REFINED PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

★ Regular (86 octane)	11.25-11.75
★ Premium (94 octane)	12.75-13.50

Gulf Coast (cargoes for coastwise or export movement):

Regular (90 octane)	11.25-11.50
Regular (92 octane)	11.50-12.00
Premium (97 octane)	13.00-13.25
Premium (98 octane)	13.25-13.75

California—Los Angeles (rack):

Regular (84 octane)	12.9-13.15
Premium (93 octane)	14.0-14.25

Caribbean area (cargoes):

Regular (87 octane)	10.50
Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16-lb. Prices for grades below 16-lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

Kerosine 42-44	10.00-10.25
Diesel oil (58 d.i. and above)	9.625-9.875
Distillate No. 1	9.625-9.875
Distillate No. 2	9.00-9.25

Gulf Coast (cargoes):

Kerosine 41-43	9.5
Distillate No. 2	8.75-9.25

New York Harbor (barges):

Kerosine 41-43	10.85
Distillate No. 2	10.35
Diesel fuel, 48-52 d.i.	10.65

Caribbean area (cargoes):

Distillate No. 2	8.75

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank cars	6.50

New York (export):

126-130 A.m.p. crude scale (solid in bags or barrels)	7.35

★ Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$2.00-2.10
Gulf Coast (cargoes):	
Bunker C fuel	$2.10
New York Harbor (barges):	
Bunker C fuel	$2.65
Caribbean (cargoes):	
Bunker C at Aruba, N.W.I.	$2.10
California (rack):	
Bunker C fuel, Los Angeles	$2.10-2.20

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	24
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	20.75
Pennsylvania Grade:	
145-155 vis. at 210, bright stock. 8 color, 25 p.t.	24
200 vis. neutral (180 at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.02	....	....	....	....
15-15.9	2.08	....	....	....	....
16.16.9	2.13	....	....	....	....
17-17.9	2.19	....	....	....	....
18-18.9	2.24	....	....	....	....
19-19.9	2.30	....	....	....	....
20-20.9	2.35	$2.50	....	$2.37	....
21-21.9	2.41	2.52	....	2.39	....
22-22.9	2.47	2.54	....	2.41	....
23-23.9	2.52	2.56	....	2.43	....
24-24.9	2.58	2.58	$2.91	2.45	....
25-25.9	2.64	2.60	2.93	2.47	....
26-26.9	2.69	2.62	2.95	2.49	....
27-27.9	2.76	2.64	2.97	2.51	....
28-28.9	2.83	2.66	2.99	2.53	....
29-29.9	2.91	2.68	3.01	2.55	....
30-30.9	2.97	2.70	3.03	2.57	....
31-31.9	3.04	2.72	3.05	2.59	$2.46
32-32.9	3.12	2.74	3.07	2.61	2.48
33-33.9	3.20	2.76	3.09	2.63	2.50
34-34.9	3.27	2.78	3.11	2.65	2.52
35-35.9	3.34	2.80	3.13	2.67	2.54
36-36.9	3.39	2.82	3.15	2.69	2.56
37-37.9	....	2.84	3.17	2.71	2.58
38-38.9	....	2.86	3.19	2.73	2.60
39-39.9	....	2.88	3.21	2.75	2.62
40 and up	....	2.90	3.23	2.77	2.64

*Includes Oklahoma, Kansas, North Dakota, West Texas (sweet), North Central Texas, North Louisiana, Arkansas, and Wyoming (sweet). †Low-cold-test Gulf Coast. ‡Sour.

Effective dates: California, February 7, 1956; east of California, June 15, 1953; Pennsylvania Grade, March 16, 1956.

FLAT PRICES

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.20
Middle District	4.07
Southwest Pennsylvania	3.78
West Virginia	3.66
Buckeye Grade	3.60
Zanesville Grade	3.02
Illinois Basin	3.00
Canada:	
Leduc-Woodbend (flat prices D-2, D-3)	2.60
Redwater (Alta.) D-3	2.49
Smiley-Viking (Sask.)	2.28
Fosterton (Sask.)	1.29
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-48.9°, Tucupido	*3.40
San Joaquin, 41°-41.9°, Puerto La Cruz	*3.04
Oficina, 35°-35.9°, Puerto La Cruz	*2.80
Tia Juana medium, 26.5°-26.9°, Amuay	†2.30
Quiriquire, 16.5°-16.9°, Caripito	‡2.21
Lagunillas heavy, flat, Amuay or Las Piedras§	2.05
Bachaquero, 16.5°-16.9°, Amuay or Las Piedras§	‡1.90

*Plus or minus 2 cents per barrel for each degree gravity change. †Plus or minus 2.5 cents per barrel for each half-degree gravity change. ‡Plus or minus 3.5 cents per barrel for each half-degree gravity change. §Also available at La Salina at 3.0 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$1.97
Iranian, 34.0°-34.9°, Bandar Mashur	1.91
Iranian, 34.0-34.9°, Abadan	1.86
Iraq, 36.0-36.9°, Fao	1.87
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.72
Qatar, 39.0°-39.9°, Umm Said	2.06
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.46
Iraq, 36.0°-36.9°, Tripoli, Banias	2.46
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°-38°	2.60

TANKER RATES (PER LONG TON)

(Latest reported spot fixtures)

★NWI-USNH, dirty (Scale+110%) (35s. 6d.)	$4.99
★NWI-UK, dirty (Scale+90%) (61s. 9d.)	8.68
★PG-UK, dirty (USMC+35%)	14.72
★PG-UK, dirty (Scale+105%) (94s. 10d.)	13.32
★PG-USNH, dirty (USMC+30%)	16.51

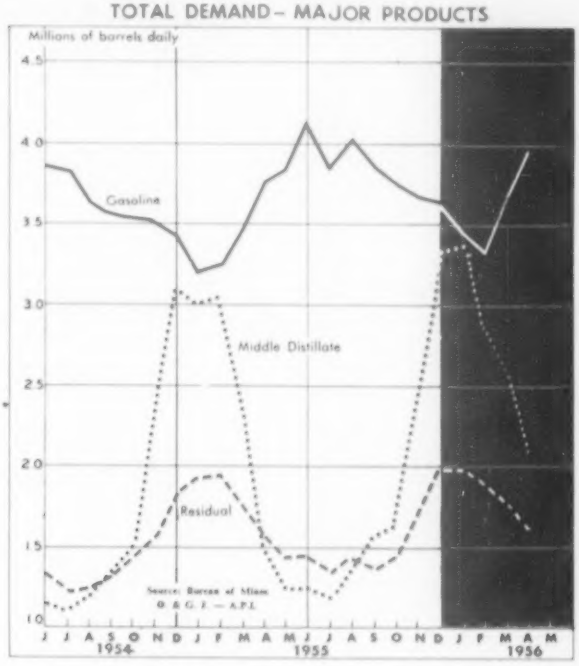
SUPPLY AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

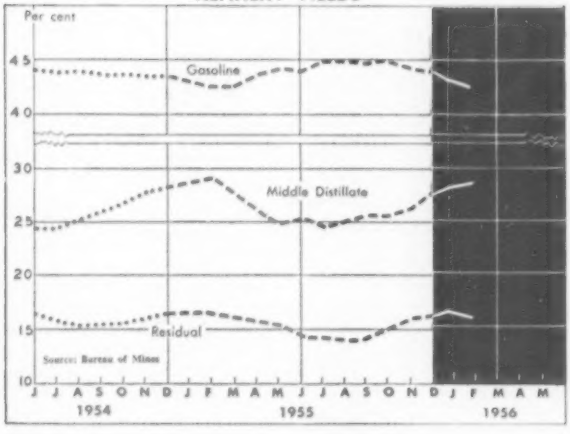
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
April 1956*	3,974	3,581	189,773
March 1956*	3,704	3,710	198,209
February 1956	3,440	3,745	196,092
May 1955	3,836	3,508	168,751
April 1955	3,786	3,409	175,601
KEROSINE			
April 1956*	286	310	18,089
March 1956*	396	354	17,333
February 1956	481	385	18,712
May 1955	138	296	26,375
April 1955	202	312	21,486
DISTILLATE			
April 1956*	1,719	1,720	62,809
March 1956*	2,170	1,817	62,583
February 1956	2,450	1,918	71,335
May 1955	1,099	1,519	83,559
April 1955	1,287	1,534	70,139
RESIDUAL			
April 1956*	1,615	1,140	32,793
March 1956*	1,732	1,224	33,896
February 1956	1,932	1,286	35,673
May 1955	1,444	1,110	45,083
April 1955	1,553	1,110	43,838

*Preliminary. †Thousands of barrels.

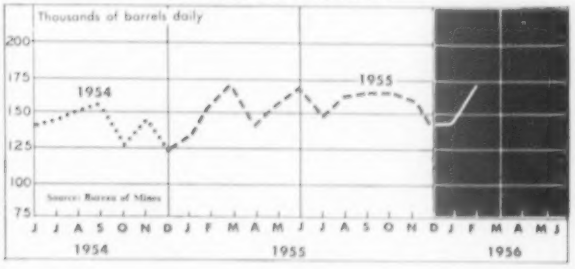
TOTAL DEMAND – MAJOR PRODUCTS



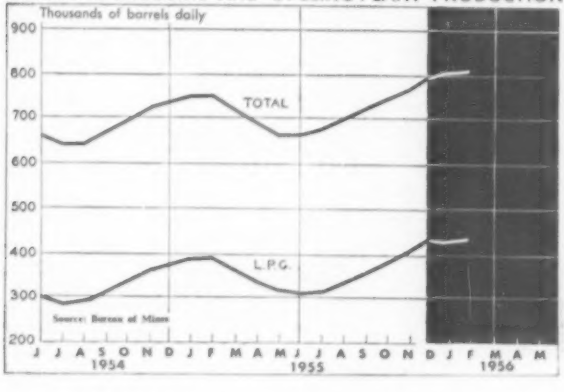
REFINERY YIELDS



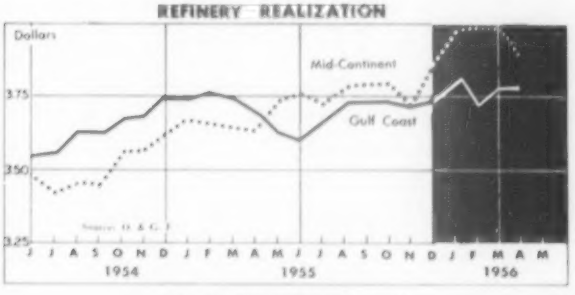
JET-FUEL PRODUCTION



NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



REFINERY REALIZATION



REFINERY REALIZATION

	Apr.* 1956	Mar.* 1956	Feb. 1956	Apr. 1955
Mid-Continent	$3.90	$3.95	$3.92	$3.63
Gulf Coast	3.78	3.78	3.78	3.70

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel oil, and residual as published in The Oil and Gas Journal.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

CLASSIFIED ADVERTISING

FOR SALE EQUIPMENT

FAILING 1500 H.D. drill with 4½ x 5 pump, automatic pulldown, mounted on 1951 Ford. Also, Griffin water tank, mounted on 1951 Ford. Write P. O. Box 819, Longmont, Colo., Phone 1333.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

FOR SALE: National 50 Drilling Rig Complete, for details, call or write Ralph W Shebester, Box 337, Pauls Valley, Oklahoma. Telephone 570.

MODEL S-32 Special Walker-Neer Spudder, complete with standard equipment, including 8¾" x 7" x 60' telescoping poles, Model No. 140 GKU-Waukesha Engine, Model 8041 Brown Line Transmission, mounted on Tandem Float, purchased new November, 1955. Equipped with complete tools, Dog House, 49 GMC, FC 452 truck and oilfield platform BC True Trailer, $35,000.00. The Theiss Drilling Company, 740 West Fifth Street, Fort Worth, Texas.

GAS COMPRESSORS—3 Bessemer type 10 twins direct connected units—Boswell-Frates Company, 1003 Kennedy Building, Tulsa, Oklahoma.

COMPRESSOR BUILDING — Structural steel, 12' x 35' x 120'. Boswell-Frates Company, 1003 Kennedy Building, Tulsa, Oklahoma.

FOR SALE—27,540 ft. 3¾" O.D. x ½" wall cold drawn tubing A161. New. Half Price. Joyce Equipment Company, 406-12 Ward St., Chester, Pa. Phone—CHester 4-1364.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE

Complete National T-20 Split Rotary Rig with 96' Lee C. Moore Hi Speed Derrick & 5' Lee C. Moore Folding Type Substructure; 4000' 4½" drill pipe; powered by 2 sets Twin Six GM Diesels. One-owner rig purchased new in March 1953. Located in NW Nebr. Will price at location or FOB location of buyer. This is an opportunity to buy an exceptional rig at considerably below supply store price. Will finance at supply store terms or better.

BOX J-531,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

NEED A PIPE LINE

Have 800 Miles 8" Line Pipe we are taking up through Illinois, Indiana, and Ohio. Will furnish pipe, go in on a deal, or finance.

We are open for any kind of deal.

REDNEB PIPE CO.

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Phone 4-7767—68

FOR SALE EQUIPMENT

CORE DRILLS, SPUDDERS, ROTARIES. New and used equipment. Everything in supplies. Fishing tools rented. Pressey & Son, Pueblo, Colo.

J-55 TUBING FOR SALE. 7600 ft. 3½" O.D. 9.20# Range 2 S.S. Call or write P O. Box 4024, Phone FEderal 7-2145. Odessa, Texas.

DRILLING RIG. 5½ Keystone, Number one condition. Steel mast. 1500 drill & sand line. Good rubber. Enough of tools for two rigs. All for $2500.00. M. J. Regan, Coffeyville, Kans.

FOR SALE—2 truck mounted Bettis steam units. Good condition, equipped for oil field work. Box J-332, The Oil and Gas Journal, Tulsa, Oklahoma.

GARDNER-DENVER 2-stage gas compressor, less engine, completely unitized with coolers, scrubbers and engine skid. Completely overhauled by Gardner-Denver. Perfect condition guaranteed. Gulf Southwest Service Co., P. O. Box 1328, Shreveport, La.

FOR SALE: Slightly used Model 118 Royal Scintillator, $1250.00. Write L. E. Farley, Inc. P. O. Box 6841, Houston 5, Texas. Or phone Earl Tise, JAckson 2-3791.

5—KOBE TRIPLEX pumps, size #3, complete w/engines consisting of: 2—LeRoi H-540 V8 motors. 3—Buda 6MO672 motors. 1—Parkersburg steel building, 24' x 24'. 2—Parkersburg steel building, 12' x 24'. 1—Parkersburg steel building, 20' x 24'. 25—Kobe units complete w/all accessories. Approx. 115,000' of 1" Kobe tubing. This material all in good condition. Complete inventory upon request. Phone AM 6-0636, Garfield and Pasternak, 1402 Mile High Center, Denver, Colorado.

2—MAYHEW Model 1000 Heavy Duty Combination Air and Water Drills mounted on L & R-190 International Trucks. 2—315-CFM International Diesel Skid mounted Schram Air Compressors. V. M. Shortes, Lovington, New Mexico. Phones 8533 or 3791.

FOR SALE: Single Engine Wilson Giant powered by G.M. Diesel with torque converter, Wheland pump, 87 ft. Moore Mast, Rig complete for 3,000 to 5,000 ft. drilling. Box J-523 The Oil and Gas Journal, Tulsa, Oklahoma.

M350 BETHLEHEM Draw Works reworked completely with National 75 Drum Flanges installed, has Compound, Starting Engine. Two EK Waukesha Motors like new. Bargain. P. O. Box 4401, Oklahoma City, Pho. ME 7-4343. Harman Pipe & Supply.

FOR SALE
35,000' 7" SS 8 Thd Rge 2 Casing
25,000' 2" EUE Tbg Range 2 & ¾ Rods P&P
50,000' 2", 3", & 4" Line Pipe T&C
5—Pumping Units—Emscos, Parkersburg, & United
GLENN SUPPLY COMPANY
P. O. Box 1104 Ph—DI—3-9607
Tulsa, Oklahoma

GASOLINE PLANT EQUIPMENT FOR SALE

1—800# 20 MMCF Absorber with Scrubber, etc.
1—Fluor "Counterflo" Induced Draft Cooling Tower Complete.
2—10 MMCF LTX Units.
2—20 MMCF LTX Units.

Vessels, Generators, Pumps, Instruments, Pipe, Valves, and Fittings and Other Equipment necessary in Gasoline Plant Construction. Detailed Inventory Available upon request.

Southern Production Company, Inc.

P. O. Box 670 Phone—EDison 2-8101
FORT WORTH, TEXAS

FOR SALE EQUIPMENT

BRILL LIQUIDATION!

FORMER LACY REFINERY
BIG SANDY, TEXAS

COMPLETE POLY UNIT, BUILT 1950
UOP RATED 144 BBL./DAY

Complete Perco unit built 1950, Phillips Petroleum rated 1400 bbl./day.
1—Wyatt 30" x 70' Stabilizer 160# 30 tray
20—Brown fintube exchangers, 600# 140 sq. ft. 4-6 chrome.
30—Brown fintube exchangers, 600# 11, 21, 77, 101, 140 sq. ft.
5—Adm. Heat Exchangers, 644, 434, 346, 176 sq. ft.
2—Perco reactors 4500 gal., 8' x 12', 347 stls. st. 120#, 1000° F.
1—5' x 96' tower, 40 tray, 135# WP.
1—7' x 30' Propane tank, 250# WP.
1—10' x 50' Crude tower, 18 trays.
1—6' x 34' Vacuum tower, 156#.
1—2' x 50' tower, 24 trays.
3—Welded tanks, 10' x 40', 10' x 30', 8' x 20'.
3—St. Exchs., 920, 850, 480 sq. ft.
9—Oilfield boilers, 125 hp., 275#.
1—Ethyl lead plant.
3—Penn. comp. 8 x 11 x 9, 12 x 11½ x 13, 10 x 6 x 11.
2—Convection furnaces, 20 MIL BTU/hr.
1—Vapor phase cracking furnace.
12—Welded storage tanks, 5000, 2000, 100, 500 Bbl.
6—Hi-vol pumps, 10 x 7 x 18, 10 x 6 x 12, 6 x 4 x 12, 6 x 3 x 8.
20—Duplex piston pumps, all sizes.
1—10' x 30' asphalt still.
6—Steel Bldgs., 20 x 150, 12 x 20, 20 x 40, 20 x 20.
8—GR Fin Tube Exchangers, 101 sq. ft.
1—BS&B Oil & gas separator, 10.7 mcf, 3500 Bbl./day.
Large Selection of Series 15, 30 Steel Valves, 1" to 8".
Approximately 15,000 ft. Schedule 40, 80 pipe, 2" to 8".

EQUIPMENT ELSEWHERE

COMPRESSORS AND PUMPS

2—Worth. LTC-6 830 hp Comps.
3—Clark RA-8 800 hp. Comps.
1—Worth. LTC-3 400 hp. Comp.
1—IR XVG-8 300 hp. Comp.
B-J hot oil pump 3 x 9, 13 st, 325 gpm, 4620' hd.
Gould 16" pump 10,500 gpm, 135' hd.

COLUMNS

7'6" x 55' 30 trays 45 lb.
8' x 75' 25 tray 40#
7' x 60' 35 tray 560#
5'6" x 59' 30 tray 200#
2' x 42' 30 tray 250#
13" x 35' 30 tray 500#

HEAT EXCHANGERS AND STILLS

6—Adm. 785, 742, 425 sq. ft.
3—St. 2000, 785 sq. ft.
30—Atmospheric Bentube exch., stls and Adm. 715, 470 sq. ft.
30—304 SS shell & tube condensers 100-1000 sq. ft.
Lab Petro-chem furnace 50,000 BTU/hr.

TANKS & VESSELS

3—10' x 40' hor. wld. tanks
2—8½' x 25' hor tanks 50# WP.
1—10' x 30' hor welded tank

MISCELLANEOUS

800 ft. of 2" 4-6 ch pipe
Large quantity of 410 SS chrome strips and sheets.
Tremendous selection stainless steel and steel valves ½"-6".

Partial List Only

WIRE! PHONE! WRITE!

For Detailed Circular

BRILL EQUIPMENT COMPANY

4101 San Jacinto St., Houston 4, Texas, JA 6-1351
Or
2401 Third Ave., New York 51, N. Y., CYpress 2-5703

FOR SALE EQUIPMENT

FOR SALE—Used: 100 Joints, approximately 3,100 feet of 4½" OD Grade "D" Drill Pipe with 5¾" to 6" OD Tool Joints with 4½" FH Threads. This pipe is located in Oklahoma City, priced at $1.50 per foot. Call FALCON SEABOARD DRILLING COMPANY at MElrose 7-2441 in Oklahoma City, or LUther 7-6592 in Tulsa.

FOR SALE: 86' Oilwell Mast, with 4½ Substructure. Telephone: CE 2-6318, Oklahoma City, Okla.

ALMOST NEW 3000 feet portable rotary complete, trucks, floats, etc., HO 5-3965, #2 Carolane Trail, Houston.

200,000' 2⅜" OD new electric weld upset tubing range 2.8 round thread, hydrostatically tested 3000# PSI. Guaranteed to give same service as seamless tubing 30-60 day delivery. Box J-497, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Wilson-Snyder mud pump, 7¼" x 18". Top condition and less than half price. L. T. Peyton Machine Shop, Vernal, Utah. Phone 267

EMSCO 250 RIG, complete with Emsco double mast. Excellent condition. 4,000-ft. practically new, 4½-in. drill pipe. Rig now running. Bargain. Phone FOrest 8-5886, 421 Meadows Bldg., Dallas, Tex.

HEAT TREATER—McKelvy 4' x 20'—25# WP—2" Kimray valves—350,000 BTU—rated 500 Bbls. fluid 500 MCF gas per day—Boswell-Frates Company, 1003 Kennedy Building, Tulsa, Oklahoma.

FOR SALE—Approximately 44,000 feet good used 6⅝ inch lap weld line pipe, Double Random, beveled, racked at Neal, Kansas. Kenland Oil Company, 823 South Detroit Tulsa. Telephone DIamond 3-4933.

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PURE OIL REF., CHARLESTON, W. VA.
AND BAY REF., McPHERSON, KANSAS

HOT OIL PUMPS—Simplex, Duplex, Centrifugal, 100 to 400 GPM, 100 to 1500 PSI-Steam, Electric Motor, Gas & Diesel Drives.
STEAM PUMPS, Simplex & Duplex, 22 to 500 GPM, 100 to 1500 PSI.
FRACTIONATOR, 6'-6" x 98'-0", Shell ⅜", Heads ⅞", 40 trays.
GYRO FRACTIONATOR, 6'-6" x 72'-0", Shell & Heads ⅜", 16 Trays.
CLAY TOWERS, 12'-0" x 30'-6", Shell & Heads 11/16", No Trays.
STABILIZER, 3'-0" x 55'-0", Shell & Heads 11/16" Top Hd. Flgd.
NAPHTHA FLASH TOWER, 3'-0" x 37'-6", Shell & Heads ⅜", 7 Trays.
STABILIZER, 3'-0" x 49'-0", Shell & Heads, 11/16", 30 Trays.
STABILIZER, 4'-0" x 48'-0", Shell & Heads ⅝", 30 Trays.
FRACTIONATOR, 3'-6" x 56', Shell & Heads ⅜", 22 Trays.
FLASH TOWER, 7'-6" x 32'-6", Shell & Heads ⅞", No Trays.
Other Towers & Pressure Vessels, various sizes & Pressures.
Over 100 Heat Exchangers, Condensers, Reboilers, & Coolers from 80 to 1500 sq. ft. capacity, Admiralty & Steel Tubes.
Updraft Heaters, Cracking & Reformer Heaters.
Ethyl Lead Blending Unit, 8500 gal. cap. tank, complete.
Compressors, Gas & Steam Driven.
Sharpless Centrifuges, Oil Filter Presses, Chillers, etc.
Tank Plate 3/16"-¼" and ⅜"—large size sheets.
Valves—Fittings—Used Structural Steel.

MANY OTHER ITEMS—

WRITE FOR CATALOGUE

BROWN-STRAUSS CORPORATION

1546 Guinotte Ave., Kansas City Mo., Phone HA 1-1000
Field Office: Cabin Creek (suburb of Charleston, W. Va.)
Phone East Bank 5611. Roy Crisp, Mgr.
P. O. Box 2921, Charleston, W. Va.

FOR SALE EQUIPMENT

U-15 DRILLING RIG located in Beaver County, 3 NKU Waukesha Motors, Hydraulic Floor Operated Blowout Preventor, 131' Lee C. Moore Mast, steel mud pits, 7¾ x 16 Gardner-Denver pump, 8000' 4½" Drill Pipe recomplete. Call CEntral 2-6318, Oklahoma City, Oklahoma.

EQUIPMENT WANTED

USED 315 cubic foot portable air compressor with or without engine. Green Machinery Co., Inc., 1201 East 5th St., Plainview, Texas.

WANTED: Joy or Fuller Compressors. Give description and price. P. O. Box 1732, Tulsa, Okla.

EQUIPMENT WANTED. 1500 Failing, drill pipe, 4½x6 and 5x8 mud pump, also 200 Sullivan. Fred E. Butler, Box 481, Pueblo, Colo.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

HELP WANTED

WANT REPRESENTATIVE in South America for specialized line of oilfield production equipment. Commissions are far above average. Send resume giving sales outlets and sales force. Box J-491, The Oil and Gas Journal, Tulsa, Oklahoma.

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United Geophysical Corporation

POST OFFICE BOX "M"
PASADENA, CALIFORNIA

PETROLEUM ENGINEERS

Graduate Petroleum Engineers with 2 - 6 years' experience wanted by Major Oil Company for work in Mid-Continent and Gulf Coast areas. Openings available for Reservoir and Field Production Engineers. In first reply give resumé of experience, date available, and salary expected.

BOX J-479, THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

SALES REPRESENTATIVES WANTED:

Manufacturer of Oil-Gas Separating, Treating, Metering, and Automatic Lease Equipment wants commission Sales Representatives for (1) East Texas, Southern Arkansas, Northern Louisiana, (2) Texas Panhandle, (3) Williston Basin, (4) Illinois, Indiana, Kentucky, (5) Canada, (6) Mexico. Protected Territories available on exclusive Contract Basis to qualified and experienced men. Please give details concerning Sales Coverage, lines handled, and sales experience in first reply.

BOX J-507,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

SIX CAREER OPPORTUNITIES
With
Responsibility and Challenge

The Parkersburg Rig & Reel Company, manufacturers of oil and gas equipment, have six long-range positions immediately available for qualified engineers.

CHEMICAL ENGINEERS (2) You will work with a small development-team of engineers. Your job will be the improvement of existing apparatus and the design and development of new equipment. As we see it, you are ideally suited for this work if you have 3 to 10 years, or more, oil-country experience as a gas engineer or process engineer. Your desire to tackle problems of adsorption, heater design, and vapor-liquid separation will count heavily.

MECHANICAL ENGINEERS (2) Here, too, you will work as a member of a small, fast moving development group on the improvement of present apparatus and the design and development of new products. You should have 1 to 5 years oil-country experience in pressure-vessel design, piping systems, or the mechanical aspects of oil production equipment.

APPLICATION ENGINEERS (2) This work is a part of a product-service group within an engineering department. You should have a keen interest in applying apparatus to the needs of the lease operator. You will be a link between the salesman and the engineering group. Technical writing is a part of the work. For this job, we believe you should have from 2 to 10 years, or more experience with oil-country equipment. Some of this time might well have been in sales-work.

If these openings interest you, please send us a resume of your experience. We will reply promptly and your application will be held in confidence. Salaries for these positions are open and will depend upon your experience and ability.

Address your reply to

The Parkersburg Rig & Reel Company,

Box 13295, Houston 19, Texas

HELP WANTED

PETROLEUM ENGINEER

Independent drilling and production company operating in Mid-Continent area has opening for young graduate petroleum engineer specializing in drilling techniques and machinery. Must have field experience. Will work closely to manager of operations. Good personality essential. Age limit under 35. Give past employment record and educational background in reply. Reply

Box J-515,
The Oil and Gas Journal,
Tulsa, Oklahoma.

AREA ENGINEERS

Several graduate engineers with minimum 5 years' experience supervising maintenance engineering functions in oil refining or producing facilities, power plants, heavy industrial installations, manufacturing plants or related operations. To establish technical supervision, procedures, maintenance operations and schedule routine and special work for major oil producing and refining operation with all supporting facilities; i.e., housing, feeding, recreation, etc.

Salary commensurate with background and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 64

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

HELP WANTED

PETROLEUM ACCOUNTANT

Practical accountant to handle office detail for an established independent oil producer. Knowledge of field operations, materials and where used will be helpful. Salary commensurate with experience and ability.

CRAWFORD PRODUCTION COMPANY
316 Enterprise Building, Tulsa 3, Okla.

PETROLEUM ENGINEER

Graduate with 3 to 5 years experience in reservoir and valuation of oil and gas reserves, opening with Mid-Continent Area Bank. In reply give resume of experience and salary expected.

All replies confidential.

Box J-500,
The Oil and Gas Journal,
Tulsa, Oklahoma.

OIL FIELD SERVICE ENGINEERS

Mechanical or Petroleum Engineers with some field experience. Men without degrees but with two years rotary or workover rig experience may qualify. High school diploma or equivalent required. Age under 35 preferred. Good pay with excellent fringe benefits. Automobile and expenses.

Contact

BAKER OIL TOOLS, INC.
P. O. Box 3048
HOUSTON 1, TEXAS

HELP WANTED

EXPLORATION EXECUTIVE—Independent oil producing corporation operating in Mid-Continent field desires experienced man presently employed in middle or top-management exploratory capacity. Please furnish age, education, experience, references and salary required. All replies will be kept confidential. Box J-502, The Oil and Gas Journal, Tulsa, Oklahoma.

Petroleum Geologists

Established Oil Company desires geologists for employment in West Texas area. Must know area and have four to six years of active experience in subsurface mapping and interpretation. Excellent opportunity for advancement. Salary will be commensurate with ability and experience. Reply should state age, education, experience, and salary desired.

BOX J-485,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

PETROLEUM ENGINEERS

For drilling production and equipment on varied types active fields.

EXCELLENT SALARY, ALLOWANCES, OPPORTUNITY OBTAIN ADDITIONAL EXPERIENCE & ADVANCEMENT.

Positions Available Venezuela & Colombia. Graduate Engineers—minimum 2 years exp.

Forward Personal data, college transcript, to:

C. L. LAUE

SOCONY MOBIL
OIL CO., INC.
26 Broadway, New York 4, New York

NATURAL GASOLINE PLANT ENGINEER

To conduct field investigations for possible new plant locations (any size) and to supervise contract negotiations, plant design and operations for substantial independent company. Should have broad knowledge of the oil and gas producing areas and successful background of plant operations. Replies should state age, outline personal history and work experience. Replies kept strictly confidential.

BOX J-501, THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

MATERIAL SUPERVISORS
(Ages 28 - 35)

A major integrated U. S. oil company operating in South America has career employment opportunities for qualified material supervisors. Position vacancies exist in activities requiring (1) 6 - 8 years experience in material cataloging, the handling of ordering, controlling, warehousing or dispatching of equipment and spare parts; (2) 5 or more years experience in materials administration work involving the analysis of warehousing operations, policies and procedures and the writing of procedural instructions. College degree or equivalent, with experience in oilfield type equipment preferred. Salary plus bonus $11,800-$14,000, depending on qualifications and experience. Liberal employee benefits and home vacations with travel expenses. Send complete resume of work experience and personal data. All replies confidential.

Box 1221
Dept. ZZ-21
New York 1, N. Y.

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(South America)

Graduate engineers with experience in drilling, production, reservoir and equipment. Working knowledge of Spanish desirable but not essential.

Lubrication Engineers
(West Africa)

Mechanical Engineer's degree and experience in lubrication and petroleum products. Fluent French not essential but working knowledge desirable.

Operations Supervisor
(West Africa)

Experienced all phases construction engineering concerning marketing petroleum products, i.e., appropriations, terminal layout and maintenance. M.E. or C.E. degree desirable but not essential. Working knowledge French essential.

LIBERAL EMPLOYE BENEFIT PLANS
SALARY COMMENSURATE WITH EXPERIENCE
Forward resume of education and experience to

THE TEXAS COMPANY
Foreign Personnel Office
135 East 42nd Street
NEW YORK 17, N. Y.

HELP WANTED

PETROLEUM ENGINEER. Active independent Oil Company has vacancy for graduate petroleum engineer for work in the Gulf Coast area. Experience in drilling and production desirable but not mandatory. In first reply give resume of education and experience and salary desired. All replies will be held in strict confidence. Box J-505, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEERS

For responsible staff positions in New York Office directing the work of groups of experienced engineers doing process evaluation and design, economic studies and related work on refining and crude oil handling facilities, together with supporting power plants and other utilities. Work entails occasional trips of short duration to Europe and Middle East. Chemical Engineering degree plus 5 years' process experience, preferably in petroleum.

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Cleveland 1, Ohio

HELP WANTED

WANTED: Man for teaching staff and part-time research in Petroleum Engineering at Rocky Mountain School. Should have M.S. or better and some oil industry experience. State general qualifications in letter. Salary open. Jox J-517, The Oil and Gas Journal, Tulsa, Oklahoma.

TOP ACCOUNTANT

with experience in pipe and machinery business. Excellent salary and opportunity for advancement if applicant has above qualifications. Reply in own handwriting giving details of background and experience. All information strictly confidential.

Box J-520, The Oil and Gas Journal, Tulsa, Oklahoma.

OPPORTUNITY IN AIR DRILLING

for engineer with sales inclinations to get in on ground floor of air drilling of oil and gas wells. Old, established compressor manufacturer, already recognized for pioneering in air drilling, needs man to head up sales and engineering program.

REQUIREMENTS:

1—Enthusiastically believe in future of air drilling.

2—Petroleum or mechanical engineer that knows drilling procedures.

3—Preferably, known in trade, although not necessary.

4—Must be interested in traveling, although home base might well be in Middlewest or Southwest with only occasional visits to Plant and Engineering Department in East.

Interviews will be arranged from written applications mailed to

Box J-508,
The Oil and Gas Journal,
Tulsa, Oklahoma.

HELP WANTED

EXPERIENCED EMPLOYEES, for all positions on seismograph field crews, wanted by aggressive, expanding geophysical company. Please give full details of education, experience, salary expected, in first letter. Box J-455, The Oil and Gas Journal, Tulsa, Oklahoma.

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A top level position for a fully qualified man. Must have experience in **West Texas and New Mexico.**

Based in Midland. Furnish references and resume of experience and background.

Box J-457, The Oil and Gas Journal, Tulsa, Oklahoma.

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For reservoir studies, reserve estimation & development work on varied types active fields.

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Positions Available Venezuela & Colombia. Graduate Engineers—minimum 3 years exp.

Forward personal data, college transcripts, to:

C. L. LAUE

SOCONY MOBIL
OIL CO., INC.

26 Broadway, New York 4, New York

OVERSEAS EMPLOYMENT OPPORTUNITIES

Major oil company operating in the Middle East has attractive positions open for qualified experienced supervisory personnel:

PETROLEUM ENGINEERS—Several vacancies for Petroleum Engineers experienced in drilling, production, reservoir, or equipment engineering.

DRILLING SUPERINTENDENTS—Fully qualified area drilling superintendents required. Must be capable of planning, organizing and supervising major drilling programs involving deep tests in high pressure areas. Will be required to administer and supervise work performed by drilling contractors.

FIRE PROTECTION SUPERVISORS—Must be fully qualified to train personnel and maintain efficiency of fire protection services in large oil refinery or in producing field installations.

ELECTRICAL SUPERVISORS—Previous supervisory experience in oil or other heavy industry required. Will be responsible for maintenance and repairs for oil fields electrical installations; including generating plants, sub-stations, distribution networks, shop areas, etc.

MECHANICAL SUPERVISORS—Must be fully qualified to supervise maintenance and repairs of mechanical equipment required for oil fields operations including drilling and production equipment, pumps, heavy construction equipment, etc.

Write, giving age, marital status, education and details of previous experience.

Box 308-O
Radio City Station
New York 19, N. Y.

HELP WANTED

GEOLOGIST—Interesting position open with consulting firm of 26 years standing. Firm opening office in New Orleans and desires young ambitious, aggressive geologist having approximately 3 years South Louisiana experience. Man will staff office alone at present and will be required to maintain some regional maps, screen drilling prospects, initiate drilling prospects and do geology on consulting studies. Man must have initiative and be willing to work as work will be supervised by superiors located elsewhere who will not be constantly at hand. Salary open. Write giving age, experience and salary required. All replies confidential. Box J-519, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGICAL SUPERVISOR
GEOLOGISTS

Fully integrated major oil company has opening for geological supervisor with 8 to 10 years experience in exploration geology in the Rocky Mountain area. Also openings for graduate geologists. Replies should furnish complete personal data, education, experience and date available. All replies confidential.

Box J-515, The Oil and Gas Journal, Tulsa, Oklahoma.

Plant Equipment Inspectors

Graduate engineers with minimum 5 years' experience in design or inspection of petroleum processing plants and equipment. Major part of experience must have been in inspection work entailing general knowledge of all facilities. Develop inspection methods, supervise and conduct inspections and advise operations on codes and equipment limitations in a major oil installation located in Saudi Arabia.

Write giving full particulars regarding personal history and work experience. Please include your telephone number.

Recruiting Supervisor, Box 90

ARABIAN AMERICAN OIL COMPANY

505 PARK AVENUE
NEW YORK 22, NEW YORK

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OR MECHANICAL
DESIGN ENGINEER

Challenging opportunity in experimental development of new adhesive bonding process involving honeycomb lamination. Experience in design problems on liquid and gaseous heat exchange required. Refinery experience desirable. For immediate consideration contact the Employment Manager, Main Personnel Office, 1001 East Broadway, Hawthorne, Calif.

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NORTHROP AIRCRAFT, INC.

HELP WANTED

INDEPENDENT OIL OPERATOR needs geologist experienced in northeastern Oklahoma. Box J-529, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS

Active independent oil company has vacancies for graduate petroleum engineers with two to five years of practical experience in drilling and production in West, West Central or North Texas. Excellent opportunities for growth and advancement. Replies should furnish complete personal data, education, experience, and starting salary desired.

BOX J-300,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

VALUATION ENGINEER

Oil Company seeking to purchase producing oil properties desires services of petroleum engineer with experience in reservoir valuation and appraisal work. In addition to practical technical knowledge and experience, must have ability to make and develop contacts. Some experience in the ABC economics of financing purchases also desirable. This is a permanent salaried position with excellent opportunities for growth. Written reply should furnish details on education, experience, age, personal and professional references, and some idea of salary requirements. Small recent photo would be helpful.

Box J-528, The Oil and Gas Journal, Tulsa, Oklahoma.

W

SITUATIONS WANTED

GEOPHYSICIST—ten years interpretation and field supervision. Desire position with oil company. Box J-503, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, single, 32, 4½ years geophysical experience, desires position in permanent location. Box J-498, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, 33, 7 years engineering experience in drilling, completion, and production, Oklahoma and Texas with major and independent. Present location Dallas. Best references. Box J-506, The Oil and Gas Journal, Tulsa, Oklahoma.

ARE YOU INTERESTED in a Young, Aggressive man with technical and administrative abilities? Degrees in Chemical Engineering and Management. Experience in design and sales of gas processing equipment. Interested only in a good growth situation. Box J-510, The Oil and Gas Journal, Tulsa, Oklahoma.

QUALIFIED MAN of long experience and wide acquaintanceship in the Oil Industry, can represent Manufacturers of Oil Field and Oil Processing equipment on the Gulf Coast, New Orleans Area. If interested write to Box J-527, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE ENGINEER desires job with independent or small to medium sized company. 10 years' experience with major in drilling, production and supervisory capacity. Box J-526, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST—10 years experience on Gulf Coast and in West Texas-New Mexico Areas, desires responsible position with small company or independent in an active exploration program. Capable of evaluating and executing all types of subsurface exploration work. Now in supervisory capacity with major. Box J-525, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST-GEOPHYSICIST, Pilot, 31, M.Sc. Geology. Desires employment with oil company starting, Middle East. Excellent knowledge Arabic, very good contacts. U. S. citizen, 5 years supervisory experience, seismograph contractor and oil company. Box J-524, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, B.S., 32, eight years experience. Past 3 years P-V-T investigation and reservoir engineering. Desires position with responsibility and opportunity for advancement. Box J-530, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM ENGINEER: 33, eight years production with major. Desires aggressive independent. Box J-521, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

HIGHEST PRICES PAID for choice oil and gas income royalties, overrides, oil properties. A. S. Berry, P. O. Box 1383, Tulsa, Oklahoma.

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TWENTY URANIUM CLAIMS embracing ore deposits testing 0.35% U_3O_8. Sell or make deal. Box J-496, The Oil and Gas Journal, Tulsa, Oklahoma.

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HAVE FOR SALE approximately 45 barrel per day shallow production central Texas, with potential of several more wells. Complete details on request. Olen Oil Company, P. O. Box 14357, Houston 21, Texas. Phone MIssion 9-2706.

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CONTACT A. L. Bowles, Box 947, Ada, Okla., for Drilling Deals, Oil Production.

FOR SALE: Producing oil and gas wells and leases located in Garvin, Stephens, Kiowa Counties, Oklahoma. For details call or write, Ralph W. Shebester, Box 337, Pauls Valley, Oklahoma. Telephone 370.

FOR SALE—Two adjoining oil leases presently under water-flood operation, located in Cooke County, Texas, currently producing 70 barrels of oil per day, two sands behind pipe, engineering report available, excellent reserves, write 913 Brown Building, Austin, Texas, telephone GR 8-9498.

FOR SALE: 100 acre 10 year term oil and gas lease, L. C. Estes survey, Shelby County, Texas, surrounded by major company holdings and activity. Price, $5.00 per acre. Write C. A. Parker, Box 507, Center, Texas, for details.

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Inquiries Invited

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Box J-516,
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Tulsa, Oklahoma.

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MAILING LISTS—Covering all branches oil industry. Free catalogue. Oil Industry Mailing List Co., 405 Tuloma Bldg., Tulsa, Okla.

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VENEZUELAN OIL SCOUTING AGENCY. Periodic reports—maps—newsletter. Mail: VOSA Apartado 3963, Caracas. Cables: VOSA, Caracas. Telephone 544802. Neal VanMiddlesworth.

BUSINESS SERVICE

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WANTED

VENTURE CAPITAL WANTED. Financing needed for oil drilling deals in Central Oklahoma. Also want contact with investors interested in acquiring oil properties. References furnished and required. Melco Drilling Co., Box 1360, Seminole, Oklahoma.

WANTED

TO PURCHASE oil production or corporations having production for cash or stock in a listed company (or combination of both). All replies strictly confidential. Box J-412, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

CAPITAL CONTACT. Will consider placing proposition requiring corporate financing on Underwriting basis. Confidential. Write Consultant 817—51st St., Brooklyn, N. Y.

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Sales Engineer to become Sales Manager of well established rapidly growing Equipment Manufacturing Corporation (Automatic Lease Equipment) with outstanding immediate earning potential. Will require approximately $30,000 to purchase appreciable percentage of closed corporation stock. Must be graduate accredited Engineering College in Mechanical or Petroleum Engineering with minimum six years experience designing, manufacturing, or selling oil and gas production equipment. None others need apply. Must be aggressive, reliable. Will be required to furnish best of references. Give pertinent information in first reply. All replies confidential.

Box J-504, The Oil and Gas Journal, Tulsa, Oklahoma.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Santa Fe, New Mexico. Notice is hereby given that approximately 129.9 acres of land in five parcels within the known geologic structure of West Red River and the Middle Red River fields in Tillman County, Oklahoma, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2:00 P. M., MST, June 21, 1956, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Land Office at Santa Fe, New Mexico. J. A. DeLany, Manager.

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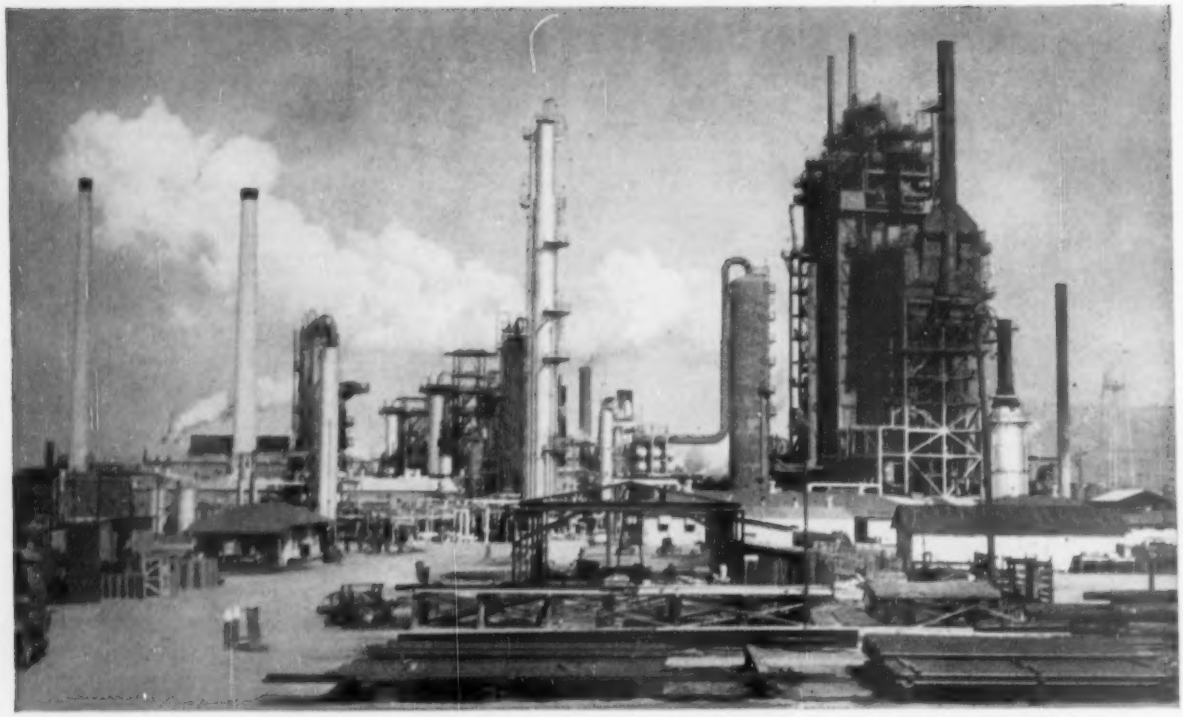

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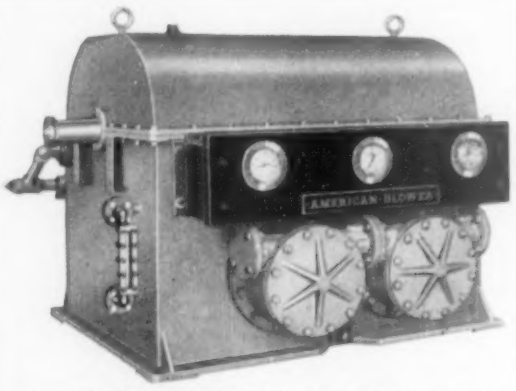

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